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The Place of the Artillery
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Columbia University Press
Publishers Since 1893
New York Chichester, West Sussex

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www.gutenberg-e.org
eISBN 0-231-50219-2

Author

Sanders Marble studied at William & Mary, then received his graduate degrees at the University of London. He was senior historian for www.ehistory.com, a project historian at the National Museum of American History, Smithsonian Institution, and is now an historian for the Army Surgeon General.

Acknowledgments

I am happy to take this opportunity to thank the many people and organizations that have helped make this book possible.

The National Army Museum has given permission to quote from the papers of Sir Aylmer Hunter-Weston and Baron Rawlinson of Trent that are in their collection. The Liddell Hart Centre for Military Archives of King's College London has granted permission to quote from the papers of Sir John Dill, R. C. Smith, K. H. Cousland, Col.

Roderick Macleod, Viscount Allenby of Megiddo and of Felixstowe, Sir Launcelot Kiggell, and Sir Archibald Montgomery-Massingberd. The Trustees of the National Library of Scotland have granted permission to quote from the diary of Earl Haig of Bemersyde.

Many departments of the Imperial War Museum were helpful in the research for this book, especially the Departments of Documents, Photographs, Film, Sound Records, and the Department of Printed Books but with the exception of Mr. C. H. I am also grateful to IWM Sound Records for permission to quote from M. E. S. Laws, Sir Thomas Armstrong, J. Ashley, C. G. Dennys, T. W. Dove, and G. Parker. Messrs. Nick Hewitt and Chris McCarthy were helpful in getting me photocopies of their materials.

The Royal Artillery Institution allowed me to range freely through their wonderful holdings, and I owe thanks for advice, information, and cups of tea to Mrs. Janice Davies, Mrs. Bridget Timbers, and Mrs. Elizabeth Maisey. Two successive Historical Secretaries also require mention here: Brigadier K. A. Timbers, FI Mgt welcomed me as a researcher, shared his deep knowledge of artillery technology, and was instrumental in writing the glossary; and Lt. Col. Will Townend has given permission to quote from the papers in the RAI collections.

The descendants of L. A. Hawes, E. G. Angus, Baron Rawlinson of Trent, Baron Horne of Stirroke, Sir Stanley von Donop, and Sir Ivor Maxse have also kindly given me permission to quote from their ancestors' papers. In some cases it has not been possible to trace all copyright holders; I can be reached at sandersmarble@yahoo.com for any correspondence.

Professor Brian Bond, my supervisor, was extremely helpful while making me stand on my own. Mr., now Professor, Peter Simkins was a fount of thought-provoking information and sensible advice.

In the process of turning a dissertation into an e-book, Professor Paula Petrik very kindly allowed me to sit in on a class about history and websites and also made arrangements for me to use the scanning facilities of George Mason University.

Finally, I am very lucky that my parents never batted an eye when I kept pursuing my interest in a very specialized aspect of history. Thanks for making it all possible.

Abbreviations

AA	Artillery Adviser
BEF	British Expeditionary Force
BGRA	Brigadier-General, Royal Artillery (a Corps level officer)
BL	breech-loading, true for all World War I guns, but normally used only

for guns when shell and propellant charges were loaded separately in a two-step process.

CB	counter-battery
CBSO	Counter-Battery Staff Officer
CDS	Central Distribution Section
CHA	Commander, Heavy Artillery (a Corps level officer)
CRA	Commander, Royal Artillery (a divisional level officer)
FAT	Field Artillery Training
FS	Flash Spotting Company
Company, FSC	
GAT	Garrison Artillery Training
GHQ	General Headquarters of the BEF
GOC	General Officer Commanding
GOCRA	General Officer Commanding, Royal Artillery (a Corps level officer)
HE	high explosive
KBS	Kite Balloon Squadron
MGO	Master General of the Ordnance, the senior officer in charge of weapons and equipment procurement for the Royal Artillery
MGRA	Major-General, Royal Artillery (Army- and GHQ-level officers)
PSC	Passed Staff College; post-nominals for fully-trained staff officers
QF	quick-firing, describing the first guns that had recoil mechanisms that returned the gun to its firing position after each round. As a result, guns could fire up to 20 rounds per minute, but only 8 rounds sustained because otherwise the barrels became dangerously overheated and were liable to fire shells before the breech was closed. QF guns revolutionized artillery around the turn of the twentieth century, but due to budget constraints the Territorial Force began the war with older guns modified into QFs.
RAF	Royal Air Force (from 1 April, 1918)
RAHQ	artillery headquarters of a Division
RE	Royal Engineers
RFC	Royal Flying Corps (until 1 April, 1918)
SR Section, SRS	Sound Ranging Section
SS	Stationery Services

1. Introduction

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Was World War I fought in the best way possible? The casualty totals show that the combatant armies and nations fought hard, but they have also been used as evidence that it was not fought well at all. At the time these figures did not look so bad: censorship, deferential societies, and a shared win-the-war spirit all helped mask the problems. Two other points are sometimes lost. For all the accusations of incompetence—of being butchers or bunglers—leveled at First World War generals, they were not trying to do badly; moreover, critics often lose sight of the rapid pace of change during the war, as new ideas were tried and accepted, modified, or rejected. A more difficult charge is that the war was not fought as well as possible, not in a "modern" way. Critics have offered a number of suggestions, but a common theme is that more materiel and technology should have been used instead of manpower. This would have meant more tanks, more aircraft, and more poison gas, but mainly more artillery.

Artillery dominated World War I. Photographs, memoirs, poetry, and prose all show the different effects of shellfire. High explosives and shrapnel bent steel, ripped flesh, and cratered the ground. While man has memorialized the war, nature still has not mended the damage, and French and Belgian farmers still reap their steel harvest. But what drove the artillery? How was it used? Was it used effectively? As effectively as possible? Who decided how to use it? Was it well integrated into the army? How did these issues change over time?

Elements of Battle

Throughout history warfare has depended on fire, movement, and morale. These elements are linked: covering fire makes movement possible, and mobility brings firepower to bear on critical points; morale carries troops through the fire-swept zone or keeps them fighting when all seems lost. For millennia, weapons and mobility were both muscle-powered, with little that was more powerful than bows and nothing faster than horses. The introduction of gunpowder revolutionized tactics but not strategy. While the chemical energy in gunpowder increased the range and power of weapons, it had no effect on mobility. Infantrymen carried their arquebuses, muskets, or rifles, and horses still pulled guns and wagons. After gunpowder there were evolutionary technical improvements, but for generations warfare changed little. With minimal study, Oliver Cromwell could have won battles in the 1630s. But from that time on, the pace of technical change increased with every year, and especially with every war.

The Western Front of the First World War is notorious for fire without movement. World War I happened at a moment of technical imbalance. Nineteenth-century discoveries had multiplied firepower but not tactical mobility. Rifling had increased the range and accuracy of small arms and artillery; more powerful and smokeless powders provided still longer range and also greater lethality for artillery; precision machine tools yielded machine-guns that would multiply infantry firepower. Better technology and improved agricultural practices increased the food supply and the population, and also allowed more farm boys to be taken into the army. The railroads could move the larger armies and their supplies from the homeland to near the fighting front faster

than ever before. But between the railhead and the front lines, armies were as reliant on muscle-power as the Romans. Immense effort went into squaring this circle. Scientists and engineers tried as hard as possible, but the vital factor—the internal combustion engine—would not bear full fruit until after World War I. Yet there was a war to win right now—in 1914, 1915, 1916, 1917, and 1918—and generals had to make the best of the materials at hand. They eagerly grabbed whatever solutions technology seemed to offer, but they could not wait for technological solutions that might or might not occur according to the schedule that the scientists promised. As a result, they changed how their armies fought. Another way of putting it is that they altered tactical and operational methods.

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In previous wars, when tactical movement had been stymied by firepower, generals had been able to maneuver strategically. For example, in the 1864-65 Overland Campaign of the American Civil War, Ulysses Grant moved to the flank and levered Robert E. Lee from every position Lee occupied rather than simply attacking head-on. His few frontal attacks were costly and only encouraged further maneuver. But by 1914, demographics and the willingness of politicians to put very large percentages of their nations' young men in uniform produced armies so large that battle-lines reached across continents. Armies now had to fight battles just to get the space to maneuver; winning strategic maneuvering room required effective tactics, the inverse of pre-war teaching. Fire, movement, and morale became the keys. The movements of infantrymen—small unit tactics—became the limiting factor of armies and of nations. Tactical movement helped move infantry firepower to where it was needed, but the infantry did not have enough firepower to solve their tactical problems. Infantry firepower increased, with light machine-guns, automatic rifles, hand- and rifle-grenades, flame-throwers, and light mortars being invented or widely distributed (or sometimes both). But men could not rival machines in producing firepower. Infantry units did not have enough firepower or mobility to capture a position held by equally well-armed opponents, even if the attackers had a substantial numerical advantage. Infantry firepower and tactics would not be enough to break the deadlock.

Morale was not as important as anticipated in World War I. Nobody had foreseen that morale was more than just a battlefield phenomenon: it was now national morale, the combined will of a people to win a war. Troops might become demoralized in battle, individuals and small groups might surrender rather than fight to the death, but rest revived a unit's flagging spirits. Armies were so large that it took repeated and consistent defeats to even begin to shake morale. Even an army as motley and unsuccessful as that of Austria-Hungary did not dissolve until well after defeat was obvious on the battlefield, on the home front, and at the conference table. Not until national victory appeared out of reach would morale truly crack.

Generals were left, through a process of elimination, with firepower as the one variable they could use to shape the course of battles, and artillery generated the bulk of firepower. This surprised the artillery as much as anyone. Pre-war armies had all stressed the primacy of infantry and cavalry, and had generated enough firepower to solve tactical problems by using more infantrymen or tactical infantry maneuvers. The problems for both infantry and artillery had been glossed over, bypassed on paper as they were to have been on the battlefield. Officers assumed that if an advance were stopped in one place that success somewhere else on the battlefield (or units outflanking the geographically limited battle) would solve the problem and

restore strategic mobility. Nobody studied how to attack a fortified or entrenched position where firepower was the key. (There were a few, especially in Germany, who studied siege warfare, but they did not envision the scale it would take in World War I.) From 1914 on, armies could no longer dismiss the problem of frontal attacks and had to devise new tactics. These quickly centered around the use of artillery because, even though few officers were analyzing problems in terms of firepower and mobility, only the artillery could provide enough firepower to address the problem.

To confuse matters, the details of the tactical challenge—although not its fundamental nature—changed throughout the war. Trench warfare is more static in contemporary minds than it actually was during World War I. Failure, and frequently even success, caused a search for improved methods. These might be as simple as more spadework or as complex as a complete overhaul of defensive doctrine. Thus an attack in 1916 might have been good enough to overcome 1915-era defenses but failed against the defenses of 1916. By 1917, as military leaders grew more studious, there were more lessons learned from success. It was no longer enough simply to repeat a successful formula; the reasons for success had to be understood and applied to what were coming to be recognized as different circumstances.

The task of the defenders was simpler than that of the attackers: to halt an attack they only needed to disrupt the attacker's combination of fire and movement. If the defenders had an edge in firepower or morale, it was almost certainly enough to win the battle. An attack without enough firepower was already in trouble, but plenty of fire support did not guarantee success. Co-ordination was the weak link. Thanks to a technological missing link, World War I was the only major war fought where generals lacked voice command. In earlier wars commanders led in person, and in later conflicts voice radio would link units. But during the war years, rigid planning had to replace on-the-spot changes of plan. Locked into a plan, the attackers were vulnerable to defensive firepower and movement. Defensive firepower could nullify either offensive fire or movement, or the defenders could disrupt the attackers' plans with two mobility options of their own—either through a counter-attack or posing obstacles to the attacker's movement (typically barbed wire). This was not the end of the chess match, and the attacker had three options to preempt these defensive plans: apply overwhelming firepower to cancel defensive mobility, firepower, and obstacles; give the attacking infantry more firepower; or find some way of improving communications. All these factors went into the analysis of move, counter move, and anticipated moves, but in war, unlike chess, lives are lost instead of pieces.

Focus of the Study

This study primarily examines the British and Dominion forces operating on the Western Front. While some of the broader comments about what artillerymen thought in general may well be true for other armies during the war, the focus here is on the British. The focus on the Western Front is deliberate: that was where the war would be won or lost, that is where tactical developments were most marked, and that is where artillery made the most difference.

Beyond the Western Front, change was slower in coming, not because officers were duller but conditions were different. East African operations were more reminiscent of nineteenth-century

colonial wars: terrain and disease were greater impediments than German firepower. Black-powder rifles were still common, and the British army was not challenged to solve tactical problems as complex as those faced on the Western Front. Elsewhere, the Turks proved themselves to be dogged fighters, but their technology, tactics, and commanders were not as sophisticated as those of the Germans. In Mesopotamia or Palestine, the British could usually solve a problem by simply using more artillery, so any improvements in technique were simply a bonus. Thus Allenby's attacks in 1918 were successful despite being outmoded for conditions on the Western Front. ¹ The British troops "gardening" at Salonika fought relatively little, their operations being stymied by the lack of support provided to the low-priority campaign. The divisions sent to Italy to face the Austrians came from the Western Front, were equipped to Western Front standards, successfully used Western Front methods, and reported that the Austrians were not as skilled as the Germans. But on the Western Front the Germans did not sit still. Their technical skill and military professionalism drove the Allies to ever better methods. When in 1918 the Americans tried tactics reminiscent of 1916, or even 1915, they suffered severely. So the British dominance over the Germans in 1918 showed that the Royal Artillery was perhaps the best in the world, having been driven by an immense challenge.

Not all aspects of artillery will be covered. The goal of this study is to see how tactical and operational changes did or did not affect strategy. Anti-aircraft guns, for example, had no effect on this. While the Royal Artillery did man some trench mortars, mortars played a role that was only peripheral to the majority of artillery work, and to operational and strategic planning. Of course, in all of its operational improvements the Royal Artillery was ably and quietly supported by many other organizations. Guns and shells had to be designed, manufactured, shipped to France, and delivered to the front. Naming only the most obvious, this involved designers, engineers, labor unions, railroads, the Royal Navy, merchant sailors, stevedores, and the Army Service Corps. Beyond these, the Army Ordnance Department repaired guns, and the Royal Engineers and Royal Flying Corps contributed in many ways. These were all quietly crucial roles but generally were "dogs that did not bark," potential rather than actual problems. These various groups usually played their roles successfully; when they could not or did not, the results were instantly obvious at the front line. Frequently it was improvements by someone else that allowed the artillery to improve in turn. It would take too much space to trace developments throughout the entire supply chain; in general, their role will be explained if they affected artillery operations and doctrine. For the flying services, adequate expression of the scope of their support for the artillery is hardly possible. From the first days of the war the two worked as closely as the limits of technology permitted. By war's end, virtually all artillery work involved some measure of RAF help, aid so often purchased with valiant lives under the guns of the Red Baron.

Two Schools of Thought?

The tremendous human toll of World War I has prompted much of the study of the strategies involved. Historians have sorted the generals into two broad categories based on their strategic thinking. Many generals sought a breakthrough, thought morale was the factor that won battles, and that cavalry would tip the scales of victory. Others planned to wear the enemy down through limited victories, using firepower rather than manpower, relying more on the technical arms of the armed forces such as the artillery and engineers. Because more generals tried for

breakthrough victories, we have evidence of how that theory worked, which leaves the field open for speculation that the second system would have been better. During the war some officers did—at least sometimes—lean towards the second (and completely different) model of fighting the war. Among these were James Edmonds (later the British official historian) and two army commanders, Herbert Plumer and Henry Rawlinson. Yet historians who suggest that the British army should have fundamentally re-cast the way it fought tend to assume that the technical arms wanted such a change. Regardless of what other groups may have wanted, the artillery did not.

Artillery officers believed their correct position was subordinate to the combined-arms commander and the general staff, because those men had to balance all facets of operations. Commanders and staff officers should not have a narrow perspective, whether it be of the infantry or artillery or cavalry or engineers. But even though they accepted someone else having the final decision, artillerymen demanded to be heard during the planning stages. If overruled, they loyally obeyed and did their best to make the plan work. So, strange as it seems, some of the most imaginative artillery plans were not actually conceived by gunners.

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Most gunners were pragmatists, not revolutionaries or reactionaries. They accepted their subordinate role, and most rejected the ideas expounded by so many historians that artillery (and technology) should have been the centerpiece of operations. The gunners quietly and constantly improved their arm so that they could help the combat arms in more and better ways. And, by the end of the war, the incremental, evolutionary steps they had encouraged and embraced added up to a revolution. Ironically, in some ways because this was not a conscious revolution, when it occurred it was accepted without inspiring a group of counter-revolutionaries.

Why not Revolutionaries?

In some ways it is surprising that artillerymen, technically trained before a war that was increasingly technical, did not argue for a more technical—or more "modern"—and less psychologically- or morale-based style of warfare. Some did urge technical solutions, especially when approaching formal siege operations. But most artillery officers accepted without visible qualms the dominant consensus of the British army, which held that, assuming a reasonable balance of technology, morale won battles. Even those who advocated a more "modern" style offered debating points rather than a fully developed doctrine, and rejoined the consensus when their ideas were either overruled or fell by the wayside.

It is important to understand why artillerymen were so willing to be part of the consensus. In part it was due to promotion patterns in the artillery. Promotion was slow, taking roughly thirteen years to rise from second lieutenant to captain, and another decade to become a major and command a battery. That gave time for even the most radical officers to be absorbed into the common ethos—or quit in frustration. Also, officers from the Royal Horse and Field Artillery dominated the higher ranks, rather than the more technically trained Royal Garrison Artillery. Garrison gunners had the least contact with other arms—coastal artillery hardly involved combined arms tactics—and the fewest opportunities for the accelerated promotion that came through campaigning. Pre-war critics said the Garrison artillerymen knew too little of combined

arms tactics; post-war critics said the other artillerymen did not know enough technical gunnery. Even during the war, there was plenty of criticism, especially of horse gunners, for not understanding gunnery. They did learn, and complaints died away. From early 1917, RGA men earned more of the senior artillery posts, but they still caused no great change in the style of operations.

It is also important to recall that it was a more deferential age. Senior figures in all walks of life were questioned less. Officers below the rank of major were simply not encouraged to think independently. Without impugning the many intelligent and thoughtful officers, the British army was not an intellectual place. Pig-sticking, polo, and horse races were more important to many officers than professional study. There was some reverse snobbery against those who studied too hard, although it seems to have been mild. But there was no advanced schooling (beyond combat experience) for officers in the artillery. Artillery officers were certainly accepted at the Staff College, and some went into positions with the Board of Ordnance, but there was no mid-career professional education for the bulk of officers. Perhaps the exemplar of these officers was A. E. Wardrop, whose two publications were the decidedly untechnical *Modern Pig-Sticking* and *Days and Nights with Indian Big Game*, yet he did a thoroughly competent job as a corps artillery commander from 1916 to 1918 and as Major-General, Royal Artillery of the Third Army during the offensives in 1918. ²

Two other factors should also be taken into account: the success of the traditional view, and recent changes in the army. The traditional ways were time-tested, and appealed to innately conservative men. This is not the place to examine the political and social views of the Edwardian professional army, but they can briefly and fairly summarized as not radical. Before 1914, the changes in both weapons and tactics after the 1899-1902 Boer War also served as a lightning rod. Conservatives said these changes had solved the problems that had been made manifest in that war and that there was no reason to pursue further reforms without evidence of new problems. Proponents of further change had to bide their time. Of course, in all this internal discussion, nobody was planning for a war that would start on 5 August 1914.

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Thus, the British Expeditionary Force started the war with most traditional ideas intact, and went from 1914 until late 1917 making steady incremental improvements; these improvements would prepare the way for dramatic changes. By late 1917, the army understood the details of fighting, and high-ranking officers had the experience that let them turn the generalities and the timeless fundamentals of war in *Field Service Regulations* into operational and strategic plans. Artillerymen were part of this shift. They not only had to learn their capabilities and limitations, but also had to get their ideas across to the rest of the army. This posed a problem, not because other officers were ignoring the artillery, but because of their lower level of understanding of technical problems and of military matters in general. By 1917, a pre-war infantry captain stood an excellent chance of being either dead, discharged for wounds, or a colonel. Yet while those colonels had plenty of combat experience, they had not been through much formal military education. Like the trenches in which they fought, these captains-cum-colonels' knowledge was deep but their horizons were narrow, and one of the major objectives for training in 1918 (and planned to continue in 1919) was broadening those horizons. In some ways, the ending of the fighting in 1918 stopped that education and halted the changes in army doctrine.

Source Material

There is a wide array of source material about the Royal Artillery. War diaries are essential, containing a range of information available nowhere else. They contain the orders typed and mimeographed, reports of what actually happened, and frequently message logs as well. Analytical reports are also often included. All available war diaries for corps artillery commanders were examined for this study, allowing comparison between different commanders and organizations. ³ Some divisional diaries were examined when they were vital for operations by a larger formation. Compared with infantry diaries, artillery diaries are fuller and more continuous. This simply reflects the different conditions the writers experienced: the officer keeping an infantry unit's diary was far more likely to become a casualty than his opposite number in the artillery. Artillery headquarters moved less often and had greater facilities to preserve relevant papers. However, army and GHQ artillery officers did not keep war diaries, and their influence has to be gleaned from General Staff diaries and other official correspondence. ⁴

More of the arguments and effects of personality can be understood from private papers. Surviving papers are highly variable, from diaries only listing the day's events to voluminous correspondence including retained copies of official papers. The most useful private papers are those of the army commanders, senior artillerymen, and Field-Marshal Sir Douglas Haig himself. General Sir Henry Rawlinson, commander of Fourth Army, left considerable semi-official and private papers. General Sir Hubert Horne and General Sir Edmund Allenby of First and Third Armies have left smaller collections that still reveal some facets of their work and thoughts. Among artillerymen, General Sir Noel Birch, who rose in 1916 to GHQ, left no papers himself, but those of his right-hand man, Lieutenant Colonel Stuart Rawlins, survive, as do many of the working files kept by Birch's office. ⁵ These files survive, for no apparent reason, in the papers of Major-General Sir John Headlam, Birch's predecessor, and a man who squirreled papers away. Agendas and minutes of many official meetings, surviving nowhere other than Headlam's papers, allow a glimpse into the details of daily command. ⁶ Lieutenant-General Sir Herbert Uniacke, senior artilleryman of the Fifth Army through two years of crucial battles, also left considerable private and official papers. ⁷ Other less senior artillerymen left diaries and papers which in the aggregate are useful but are often individually unrevealing except for detail and anecdote. ⁸ Those commanders who were imaginative and aggressive, as reflected in their private papers, did tend to be promoted.

Haig's diaries and associated papers and correspondence have already attracted considerable historical attention that need not be repeated here. Whatever alterations took place, he seems not to have altered his comments about artillery or artillerymen. ⁹ Two artillerymen wrote histories of the artillery in the war that remain unpublished. Stuart Rawlins was one of Birch's staff officers from 1915 onwards and, between the Armistice and the peace, took advantage of the files at his disposal at GHQ. (Where these were inadequate he shamelessly used his official position to get material from subordinate headquarters.) He wrote a dry staff history, carefully omitting names of guilty and innocent alike. Edgar Anstey wrote a livelier and more readable history, quoting from private letters (which have now disappeared) entrusted to him; his work,

which reached the state of galley proofs, served as the basis for Sir Martin Farndale's volume of the regimental history. ¹⁰ The Official History is intermittently useful. Written largely to show the bravery of the infantry, it generally avoids operational and strategic analysis. Yet the detailed history does mention many times the low-level effects of artillery, and the appendices contain numerous useful documents.

Official training and tactical books and pamphlets provide an excellent guide to how quickly ideas were adopted and disseminated, but do not pin down precisely when the idea sprang up. An idea must have existed before being spread, but there is no way to tell how much earlier. The Imperial War Museum has the best collection of such material, not only regulations and training volumes but also an excellent collection of doctrinal, training, and informational pamphlets produced during the war. These reported the army's latest experiences and disseminated changes with the least delay.

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Of course, a pinch of skepticism needs to be used when reading any official papers. Not all units could reach the official standard, while some felt their way was better and ignored the official methods. Also, if events had developed according to orders, the war would have been won in 1914; orders need to be read with a grain of salt and an eye on what really happened. Regardless of the "friction" of events, the official papers are a vital source for how the BEF wanted to fight the war.

Other Technical Branches

Historians have described two schools of thought within the BEF, one centering on the human aspects of battle, the other taking a more technical approach. This study will show that the artillerymen agreed with the "human battlefield" school, and believed the artillery was a supporting arm. But were the gunners alone in their views of their role within the army? There were several other technical branches of the armed service whose views can be no more than sketched here, and which are worthy of fuller inquiry. The Royal Engineers, the air forces of the Royal Flying Corps and the Royal Naval Air Service (merged into the Royal Air Force on 1 April, 1918), and the Tank Corps were all technical arms. According to the unspoken thesis of many historians, they should all have wished to fight World War I in a more technical style.

The engineers showed some inclination to do so, with some officers suggesting that the war should be conducted as if it were a huge siege. One of the main proponents of this approach, James Edmonds, later compiled the Official History and may have used this platform to exaggerate this viewpoint within the Royal Engineers. Certainly the Royal Engineers had even more technical innovations to cope with than the artillery. Most new developments first went to the engineers before being assigned to someone else. Signals is an example: telephones were first maintained and operated by the Royal Engineers before that function was passed to the Royal Signal Corps. The role of Engineer Adviser at the corps level and above did evolve into Engineer-in-Chief, while the senior gunner was never Artilleryman-in-Chief. Yet the authority of the Engineer-in-Chief ran only to purely engineer matters, and the sappers fitted themselves into larger plans.

Air forces are almost uniquely technical—they need technology to stay aloft, let alone fight. Air power theory developed rapidly during the First World War, and with astounding speed afterwards, and by the 1920s visionaries argued that armies and navies were redundant. Yet during the war the RFC waged an aggressive campaign based on morale, viewing its aeroplanes as mere vehicles for the men in them, men whose morale was still crucial. Although the air forces were reorganized into a third service in 1918, the reasons were largely political (defending Britain against German bombers and retaliating against Germany) rather than pressure from the forces in France for a more centralized organization.

The Tank Corps has attracted enormous attention. With the example of World War II tank forces in view, it seems obvious that the First World War was botched. In 1918, tank visionaries were suggesting a completely different way of fighting for 1919. The plan fortunately stayed on paper: tanks of this era could not do what the plan imagined, nor could industry build the number of vehicles forecast, nor could the army man them. In World War I tanks, used properly, helped the infantry, often in ways out of proportion to the small numbers and limited mechanical capabilities of the tanks. Yet historians of tanks often over-emphasize their wartime value in light of later developments, especially the blitzkrieg. A major difference between tanks and other weapons was one of age. Tanks were a brand-new weapon, possessing only a future; artillery was old and was comparatively well understood. Changes in artillery weapons and techniques were slower because of the mass of men who had to be re-trained; even in 1918, the Tank Corps was only 11,000 men, so changes could spread faster than through the BEF's 500,000 gunners.

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Moreover, brand-new weapons not only offer new ways of operating, they seem to require them, along with rapid revisions of those new tactics. Meanwhile, changes in an established arm are less likely to attract attention simply because it is established; people are liable to believe they understand the older things or get distracted by the new. Finally, people involved in anything new tend to be possessed of a certain amount of self-promotion. The enthusiasts around the new wonder weapons were simultaneously convinced they were right and concerned that they would be ignored.

A Combat Arm?

In attempting to decide whether the BEF should have changed their style of fighting, it is important to consider whether artillery is a combat arm or a combat-support arm. This argument still runs today, as the artillery are often the only troops engaging the enemy, but not in direct contact with them. Artillery generals can explain plans on a map, saying "and now the gunners are attacking the enemy here, then we attack them there, now shifting our attack there." The converse argument is that the artillerymen are not physically part of the attack, only their projectiles. Shellfire may well suppress an enemy, but it never captures a position—it just makes the eventual attack easier for the infantry, tanks, or cavalry. Similarly, just as tanks may roll over a feature, the infantry (albeit properly supported) still have to hold it. Today this argument is mainly for the honor of the troops involved, but its antecedent was in many minds during World War I.

The debate about whether the artillery was a combat or supporting arm had been heavily influenced by the Boer War. Without going into great detail, the Royal Artillery's ideas of how to fight a European war were demolished by their poor performance against the Boers. They had gone to South Africa, applied their doctrine for a Continental war rather than a colonial war, and failed. The artillery, after a string of failures in battle, managed to support the infantry but had failed to affect battles on its own. With big-war doctrine out the window, the experience gained in the countless minor skirmishes and colonial campaigns counted for more. Yet the "small wars" experience distorted the value of firepower. Typically, the British faced an irregular opponent, or even full-blown guerrillas. Capturing ground was not the yardstick of victory because it did not affect the enemy's willingness to continue fighting. What mattered more were the casualties inflicted. Thus the artillery became even more devoted to shrapnel-very good at inflicting casualties-and shied away from high explosives, which did more to demoralize the recipients. Artillery operations drifted towards destruction, not neutralization, and of personnel, not materiel. Why this did not affect other doctrine and thinking towards destruction and attrition is unclear, but it cannot be pursued fully here.

This distorted many soldiers' views of artillery, including the gunners' own view. Artillery firing shrapnel was simply a different kind of infantry firepower: artillery pieces were used in direct fire to essentially fire hundreds of small bullets. Guns had a greater range than rifles, and could engage enemy artillery, but there was no reason they should not go in harm's way. Viewed in this manner, it was an entirely appropriate question whether guns should be up alongside the infantry firing line. The infantry liked having their supporting artillery in sight and in shouting distance, which brings up another advantage of deploying the artillery forward: it made for better communications on the battlefield. The infantry did not feel themselves alone, and the gunners could take pride in playing their traditional role and have the honor of combat.

But South Africa had forced the separation of infantry and artillery. Artillery simply could not work effectively under long-range rifle fire. Under Mauser fire, infantry had it bad, but the gunners had it worse, having to stand up and walk around without even a gunshield to protect them. They could not "hit the dirt" the way the infantry could, or move from cover to cover.

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Despite this shattering of preconceptions, within a few months the artillery were again delivering effective support, albeit now from a distance. They accepted this change with remarkable grace considering it was the rejection of all their previous doctrine. The *Journal of the Royal Artillery* had an annual essay contest on topics of special interest. ¹¹ In 1900 the debate was about how quick-firing guns and smokeless powder affected artillery operations; 1901's topic was heavy guns and their relevance in the field. 1902's contest posed a blunt question: did South Africa provide lessons for a European war?

The answer was yes. In "small wars" guns could still be part of the firing line, but only exceptionally would that be true against a modern European foe. There were flickers of hope for a more glamorous role for artillery, and the usual problems of implementing change (money and the confusion in people's minds) helped to partially stem the tide, but there was no gainsaying the Mauser and its effects at Colenso, where rifle fire had slaughtered gunners.

The bottom line of this debate was that nobody really doubted that the infantry and cavalry were the combat arms, with artillery and engineers supporting them. Granted, the Royal Artillery and Royal Engineers were more combatant than the Pay Corps or Ordnance Department, but they were not combat arms. When aeroplanes, gas, and tanks developed, they too were categorized as supporting arms. Given the limitations of these novel weapons, the British were right not to rely on them as equals to the infantry, but while it was ultimately sensible the attitude also slowed responses to changes within the traditional arms.

Coming from the background they did, artillery officers were not arguing for an artillery-centered style of fighting. Artillerymen did not campaign for a change in the army but accepted their role as part (perhaps the largest part) of "fire" in the "fire and movement" formula. Throughout the war, when contemplating the results of a battle and how to do better the next time, artillery officers reiterated their role as supporting the infantry. Some of the brightest did so explicitly, some implicitly, while others were not so intellectual and simply carried on doing what they had been doing.

New Ideas

How did new ideas percolate into artillery doctrine? Did this process differ for different elements of artillery work? Technical improvements, those affecting gunnery, were spotted by the chain of command, quickly adopted, and disseminated top-down. Good local innovations would be propagated as soon as they came to the attention of higher authorities. Some formations actively fostered technical innovation, harboring inventors and experimenters, but that depended on the commander's personality. In sum, where technical innovations affected only the artillery there was little hesitation in making changes; the problems came when other parties were involved. Outsiders generally needed more time to understand what the artillery could do technically and integrate that with their own tactical changes and the changes the Germans were making. Incremental improvements were more easily adopted than bold innovations.

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Moreover, there were different dynamics affecting strategy and tactics. (The operational level of warfare had not yet been diagnosed in the British army.) Tactical alterations and innovations were encouraged, if sometimes only through benign neglect, by senior officers. Strategy was a very different matter and was subject to a great many more preconceptions and prejudices. This essentially implied a two-tier decision-making process: artillerymen were allowed their freedom on purely artillery questions, but on matters affecting combined-arms teamwork the other parties generally won the day. Strategy also intruded into tactics. Since the Allies' fixed grand strategic goal was to liberate France and defeat Germany, they had to attack. The preferred type of attack was the breakthrough, the decisive battle that would win the war sooner rather than later. Working its way downward, this preference affected tactics, forcing choices that generally undermined the chances of a limited success by striving for the great success. It was only in 1918, with an inter-Allied High Command coordinating and limiting attacks (perhaps the glimmerings of an operational level of war) that the BEF's fighting style changed to one that better suited the artillery.

Notes:

Note 1: Archibald Wavell, one of Allenby's staff officers and a future field-marshal himself, notes the lower number of guns needed in Palestine: Wavell, *The Palestine Campaigns* (London: Constable & Co., 1928), 206 and note. [Back](#).

Note 2: A. E. Wardrop, *Modern Pig-Sticking* (London: Macmillan, 1914); *Days and Nights with Indian Big Game* (London: Macmillan, 1923). [Back](#).

Note 3: See complete list in [Bibliography](#). [Back](#).

Note 4: Army War Diaries are listed in the Bibliography, as are the relevant WO158 Operations files, although others were consulted. [Back](#).

Note 5: S. W. H. Rawlins Papers, Royal Artillery Institution (hereafter RAI), military document 1162. [Back](#).

Note 6: Sir John Headlam Papers, RAI Military Document 183. Headlam's papers also include much material from his time in command of the Second Army's artillery in 1915 as well as—again, without explanation— from the activities of the Third Army in late 1918, when Headlam was employed at the War Office. [Back](#).

Note 7: Sir Herbert Uniacke Papers, RAI military document 1160. [Back](#).

Note 8: E.g. A. T. Anderson Diary, RAI Military Document 1301; W. StC. Bland Papers, RAI military document 1126; J. G. Geddes, Diaries, RAI military document 1135; A. H. Hussey, RAI military document 1175; W. B. R. Sandys, Diary, RAI military document 211. More interesting, not least because the author had a more active war career and put more of himself into his diary, is Sir Hugh Tudor, Diary, RAI military document 1167. [Back](#).

Note 9: Haig's official reports to the War Office, intended for contemporary publication and thus heavily self-censored—and at times containing blatant lies for public and German consumption—are mostly available online at www.firstworldwar.com/source/haig_despatches.htm. [Back](#).

Note 10: E. C. Anstey Papers, RAI military document 1159; General Sir Martin Farndale, *History of the Royal Regiment of Artillery: Western Front 1914-1918* (Woolwich: RAI, 1986). [Back](#).

Note 11: "In 1905, the Proceedings were renamed *Journal of the Royal Artillery*." [Back](#).

2. Background through the end of 1914

1

Introduction

The fifteen years before the outbreak of World War I saw a greater revolution in artillery than in the previous century, perhaps even the previous two centuries. The guns themselves changed and so did their use. But the people behind them changed more slowly, making piecemeal changes and only making those when forced to. There was an interesting mix in the British artillery forces of progressives and conservatives, and even some modernizing reactionaries. While artillerymen received new guns, they were not issued brand new ideas.

The Legacy of the Boer War

The British army began the Boer War much like it had the other colonial wars of the late nineteenth century, but quickly discovered that battlefield circumstances had changed. Suddenly the enemy had the technological advantage, and, in addition, the British found their organization to be faulty. Thomas Pakenham has thoroughly chronicled the Boer War and British shortcomings, and the details need not concern us here. ¹

These problems provoked changes. After the war, infantry, cavalry, and artillery tactics were re-examined, especially in light of new weapons that were introduced at the same time. Unfortunately, these examinations were essentially separate, with each branch working out its own problems. While the war proved a need for combined-arms tactics, afterwards the three branches reverted to a form of isolationism.

Two elements of artillery organization during the Boer War followed tradition. First, each force had a senior artillery officer attached, to command the guns in line with the force commander's plans. ² However, when he took command of the forces in South Africa, Kitchener specifically abolished the position of General Officer Commanding, RA (GOCRA) on the grounds that it divided responsibility in the chain of command and was illogical. ³ On paper this was true, but it was no worse than many other problems; on paper most of the British army's organization was illogical. Usually the army had muddled through, and the change probably owed more to Kitchener's personality and desire for centralized control than battlefield necessity. Second, there was an artillery staff, but it was located back at GHQ and concerned almost completely with administrative and technical matters, supplies of ammunition and horses, promotions and the like. ⁴ Staff duties had hardly changed since the Peninsular Campaign. (Appendix 1 contains a report on what the artillery staff did.)

5

Tactical and technical shortfalls limited artillery effectiveness in South Africa. Doctrine declared the brigade, composed of three batteries, to be the standard unit. This did not happen, and batteries were frequently used alone, or even split into sections (pairs of guns), so that every mobile column included artillery. ⁵ With artillery scattered in batteries and detachments, there were never enough guns or shells concentrated to decisively influence a battle. Nor was there much need for a command chain; artillery simply answered to the force commander, who

typically had few enough subordinates that he could directly manage his artillery. The measured judgment of the regimental historian was that "[r]eal efficiency could scarcely be hoped for until the brigade had been made a permanent unit with a proper staff, and that was not to be conceded until forced upon the War Office by the stern logic of war." ⁶ In other words, it took the proof of battlefield experience for the army to obey its own doctrine. Until the point was driven home, peacetime administration and economy meant a brigade could be formed with batteries from three different stations, a commander from another post, and the adjutant joining from yet another. ⁷ Fire had to be directed without the benefit of signalers; to save money, the army had abolished signalers for the horse and field artillery in 1899. ⁸ All this made it virtually impossible to handle a brigade as a unit, and it should be no surprise that the Royal Artillery could make little impact on the battlefield in the Boer War.

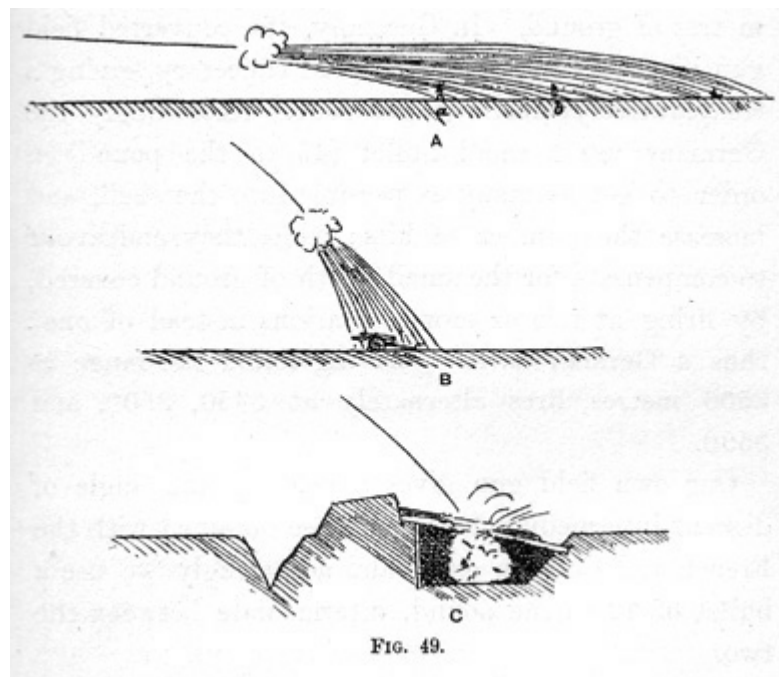
Without a GOC, RA, and with the feeble artillery staff ignoring tactics, the artillery had no voice in the higher councils where they might have had more success explaining what artillery could and could not do. Without any advocate, it was easier to do what the infantry wanted and simply scatter batteries among infantry brigades, which had the further advantage of being the traditional method. Changes were made after the "Black Week" of British defeats, but they came mainly from the brain of Lord Roberts, the new Commander-in-Chief and only by happenstance an artillery officer. While Pakenham notes the developments that took place in Natal, under Buller, the same policies were in place in Roberts' army in the Orange Free State.

⁹

Nor did the artillerymen fight hard to change things. In hindsight it was clear that the Royal Artillery came out of South Africa "opposed to the principle of centralized control," just at a time when that principle was becoming increasingly important. ¹⁰ It was not just the artillery that opposed centralization. Both the regimental structure of the British army and the Cardwell System (that rotated units between Britain and her imperial obligations) caused difficulties throughout the army in building large formations. The regimental system undermined efforts to standardize tactics even within branches (e.g., the infantry), much less efforts to foster combined-arms training or tactics. Units were almost their own little worlds. There were only limited opportunities for officers or soldiers to serve outside their own unit and learn something beyond their own unit's methods. The Cardwell System overlapped and reinforced this. Individual units (infantry battalions, cavalry regiments, artillery batteries) rotated between Britain and overseas service. Brigades were unstable collections of battalions, regiments, or batteries—unstable because of the level of turnover in their components. There was little incentive to overcome these problems: colonial campaigns were readily fought by *ad hoc* forces, while there was no European commitment that demanded larger combined-arms formations, such as divisions or even corps.

Technical problems also limited the effectiveness of artillery fire. The howitzers' high explosive (HE) shell was unreliable and gave its most visible results when it was not working properly. (It produced a yellowish cloud of smoke when the explosion was incomplete. The cloud was easily visible, and the explosion was more potent than black powder, but it fell short of the full power of HE.) The ineffectiveness of the HE shell caused great dissatisfaction with explosive shells in general, and the Royal Artillery instead embraced shrapnel. Here, too, there

were problems, for the non-quick-firing (QF) guns used in South Africa were mediocre for shrapnel firing, and that shell itself was flawed. Everybody, not just the artillery, thought the problems with shrapnel were serious, so much effort went into improving shrapnel. Artillerymen joined wholeheartedly in exalting shrapnel. Shrapnel had been a British secret weapon in Napoleonic days, and it had been the centerpiece of British field artillery for nearly a century. When trouble developed, artillerymen solved their parts of the problem with better shrapnel shells and optimized guns. They did not start a movement to reassess the place shrapnel played in British tactics, which would have needed support from the whole army. Shrapnel was superb for a specific function—killing men in the open—but was of very little use for anything else. It was also best suited for direct fire, and had serious range limits. Despite these drawbacks, which pushed the army toward other decisions and compromises about tactics, there was a definite choice of shrapnel over HE, not simply an acceptance by default. Thus, because there was no point in firing shrapnel at long ranges (it lost velocity and consequently effectiveness), the Royal Artillery adopted a gun carriage that limited range.



This shows two shells and two trajectories. "A" shows gun shrapnel, fired with high velocity and flat trajectory. These two factors cause the balls to fan out over a deep but fairly narrow area. Gun shrapnel was highly effective against men in the open, but much less effective against troops in cover or protection. "B" shows howitzer shrapnel coming down from a high trajectory. The arced trajectory limits the area covered by the balls, but also means that the balls can reach behind cover, such as a gunshield or wall. "C" shows high explosive shell penetrating cover. While clearly the most effective in these circumstances, it is also clearly less effective at covering open ground than shrapnel.

Source: H. A. Bethell, *Modern Artillery in the Field*

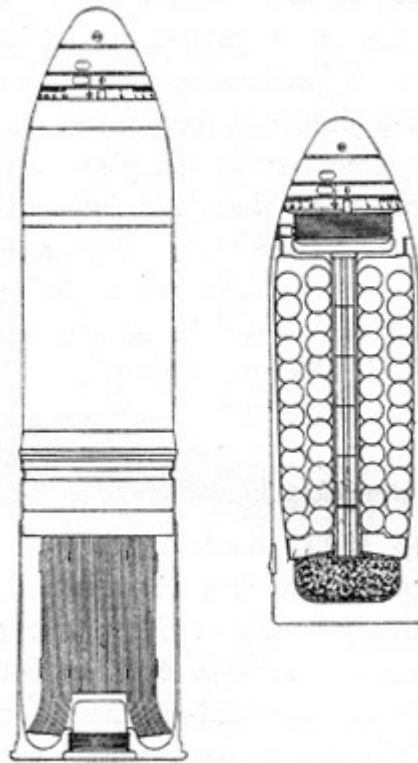


FIG. 19.

Shrapnel shell contained a number of lead-antimony balls; the antimony hardened the lead and gave it better penetrating qualities. The fuze on the nose burned as long as it was set for, then burned down the powder trail through the center of the shell, which exploded the bursting charge at the base. This blew the balls and the fuze out the nose. If a shrapnel shell exploded properly, the shell case will still be intact today. The bursting charge was only that—it was only meant to push the balls out of the shell and scatter them forward, not fracture the shell body and send fragments in all directions.

Source: H. A. Bethell, *Modern Artillery in the Field*

Mobility of equipment was another great lesson from South Africa: there were often problems getting guns where they were needed. The lesson was to build guns and carriages as light as possible, again at the expense of range. The carriage adopted for horse and field artillery had a pole-trail that was substantially lighter than a box-trail but that limited the gun's elevation and thus its range. To be fair, the British army needed equipment to fight anywhere in the world, not just in Western Europe. Howitzers saw action in South Africa, but relatively few of them because they were not as mobile as field guns. Their clumsiness provoked unfavorable comments even though they were effective in combat. Even a few siege pieces went abroad, intended for use against Pretoria's forts. Understandably, they were not very mobile. Most of the mobility problems in the field during the Boer War were due to the poor transport

arrangements. Nobody had thought about using siege artillery in the field, and the guns were towed by oxen and bullocks. The guns themselves were reasonably mobile, but their bad handling was what was remembered.

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Changing technology also forced the dispersal of guns. Infantrymen now carried magazine rifles with smokeless ammunition, accurate to 1,000 yards and lethal at twice that range. Even inaccurate rifle fire, if there was enough of it, created a fire-swept zone, a major tactical revelation of the South African war. Artillery now had to keep its distance from infantry. Thus the firing ranges at artillery practice camps doubled to 4,000 yards between 1899 and 1904. ¹¹ To go closer to an unshaken enemy was a recipe for another Colenso, where guns were abandoned after deploying in an exposed firing position inside rifle range. The bullets may have sounded like thousands of bees buzzing, but they had a deadly sting. Moreover, increasing infantry firepower meant they could spread out more, especially in defense, and still concentrate enough firepower. Wider unit frontages made it harder to outflank the enemy in South Africa, and when combined with the numbers of troops available in Europe this development would just about end outflanking opportunities.

Now attackers had to focus more on suppressing the defenders' fire and probing for a weak point than on an outflanking move. Artillery was, in theory, the main way to beat down enemy fire. But the artillery had been split up and parceled out among the infantry. The feeble central command and lack of signalers to transmit orders meant that detaching batteries probably made sense under the circumstances. That it was the least-bad option was allowed to obscure the point that it was in fact a bad option, and that better communications were vital. Splitting the guns up also reinforced the mistaken idea that the guns themselves needed to be in full view to provide fire support, that direct fire was artillery's purpose.

Postwar Reforms

These were tactical wartime changes, adaptations, and improvisations, but after the war technology intervened. The key change was making quick-firing guns standard. These had an integral recoil mechanism so the gun did not have to be pushed forward after firing; gunners could now stand behind the gun. Gun shields were also fitted, and protected the crew from rifle fire. There were a very few British QFs in South Africa, but they were rapidly adopted afterwards, which greatly altered tactics. At a stroke artillery firepower increased and vulnerability fell; perhaps the "lesson" of Colenso could be ignored, and guns again could duel infantry with Mausers.

Foreign Influences

The 1904-5 Russo-Japanese War demonstrated some features of future wars, but was widely thought to have little relevance for Britain. ¹² There were lessons for gunners about ammunition expenditure, indirect fire, centralized command, and sieges. Although both Russian and Japanese artillery fired shells at previously unimagined rates, the general European response was not to increase ammunition stocks, but to preach the virtue of economy. In Britain, this approach suited the Treasury as well as the senior officers: the

Treasury wanted to control military spending, and generals stressed high training standards. Indirect fire was another salient lesson from Manchuria, but was deprecated even there. Japanese gunners, despite delivering effective fire from covered positions, were excoriated by their own infantry for not being forward in the firing line with the infantry. With even the protagonists lamenting this development, it should be no surprise that most observers agreed. The use of massive siege artillery was another novelty. The Japanese deployed 11-inch howitzers around Port Arthur, eventually cracking the fortifications. The wider utility of siege guns was partly hidden because this was a textbook siege; few noticed how much the trench lines of other battles mimicked sieges. The RGA rewrote their manual about sieges, and the Royal Engineers were in the process of revising theirs in 1914. Interest in this war as a whole was not particularly high, and the best articles addressing it in the *Journal of the Royal Artillery* appeared from 1912 to 1915. ¹³ The general feeling was that there were few lessons for European wars to be learned from something on the other side of the world involving two second-rate military powers. In Britain, the practical lessons were shortly competing against a more exciting French doctrine.

Between 1908 and 1911, French artillery, and indeed the whole French army, was adopting a more aggressive and offensive attitude. For the artillery this meant operating mainly by batteries, up with the infantry and possibly even in front of the main firing line. Artillerymen were not to economize shells nor waste time aiming precisely, but instead to shatter the enemy's morale with *rafales*: sudden, intense, short spurts of fire. The objective was not destruction; the artillery was supposed to neutralize enemy fire for the critical moment of the infantry assault. In France this was combined with the resurgence of a morale-based concept of war as exemplified by talk of the *élan vital*, reintroduction of *pantalons rouge* with the claim that distinctive uniforms would raise morale, and adopting offensive war plans. Strategy and tactics fit together logically, if wrongly. In Britain it meant seriously reevaluating the Boer War's bloody lessons about advancing under fire. Movement became much more important than previously, and firepower less so. In 1910, doctrine switched from being governed by the axiom "the decision is obtained by fire" to "fire superiority makes the decision possible." ¹⁴ This was more than just phrasing in manuals; it was the army returning to traditional and popular views. The bayonet was back; cavalry kept their lances and sabers. Artillery would operate, if necessary, in front of the main infantry line. ¹⁵ The more cautious post-Boer War doctrine had lasted a decade in the British army. Even before the full flowering of French influence, senior officers stressed guns "support[ing] the attacking infantry by the fire of advanced sections at close quarters." ¹⁶ The hesitant steps towards concentrating guns were overturned. Artillery was dispersed, with each infantry or cavalry unit having its "complement of artillery." ¹⁷ Fitting this idea of suppressing rather than destroying the enemy, targets at practice camps were altered from points to zones. ¹⁸

The British army was not simply accepting a foreign doctrine about destruction or neutralization. British colonial campaigns had long centered on killing the enemy, because simply chasing an irregular foe off a particular hill seldom won a campaign, whereas slaughtering the "natives" was more effective. South Africa showed the difficulties of destruction, even with unprecedented quantities of shells. As British bombardments grew heavier, the Boers dug deeper (or rather they had their African servants do the actual digging) and survived. The later battles in Natal pointed toward neutralization by showing how

effective close infantry-artillery co-ordination could be. In following the French, the Royal Artillery adopted a more sophisticated doctrine and one better suited to European warfare, although location did not figure in the debate. But the mission and munitions were mismatched. Shrapnel was a killing round, not a suppressing/neutralizing one. High Explosive was misunderstood, as was the entire subject of terminal ballistics: some even claimed that HE was less effective than black powder because HE shells produced smaller fragments. (The misunderstanding of blast effects would play a role in the confusion over "shell shock.") Doctrine held that HE was only useful for destroying *things* and had minimal effect on *people*. In reality it was effective against both; although somewhat less effective against people in the open, it was more effective against people in cover. Artillery fire was judged entirely in terms of the numbers of bullet-equivalents it produced, not their effect on the enemy. All effects were judged in terms of killing, not suppressing, which was contrary to the new doctrine.

Organizational Structure

The Boer War caused a shake-up of the organization of the British army, especially of larger formations. On paper, several Army Corps had existed since just after the Franco-Prussian War, but nobody tried to reconcile paper and reality until 1902. ¹⁹ In theory, units were assigned to Army Corps, but there were not enough units: phantoms that "would be formed later" filled the gaps. Paper divisions had two infantry and two artillery brigades, and corps had a few additional howitzer batteries. There was a solid, functional, system establishing the duties of the "officer commanding the artillery of an army," "the OC the artillery of an army corps," the "OC the corps artillery," and "the OC the artillery of a division." ²⁰ In outline, this was the system Kitchener had abolished in South Africa, and it could work reasonably well with the small numbers of guns and simple techniques envisioned before the Boer War. It was also close to the system that would, of necessity, be recreated during World War I, but that did not clearly define duties. However, since these corps never really existed, commanders were never appointed nor were there (even theoretical) staff officers beyond aides-de-camp or adjutants. The corps artillery was also fictitious, mostly the batteries "to be formed." As an example, brigades of heavy artillery existed on paper for three years before actually being formed, and when they were formed the organizational charts had changed so they no longer had a role. ²¹

The Haldane reforms starting in 1907 were of far greater substance, and linked with the emerging artillery doctrine. Haldane cut his suit to fit the fabric, disbanding feeble units to strengthen and consolidate the rest; the regulars became an Expeditionary Force. The bulk of the forces in Britain would be organized into six large divisions, each of three infantry brigades and four artillery brigades. There was a GHQ in command, with the possibility of the corps as an intermediate echelon. Corps was not an important level of command, since divisions were complete in themselves: they had infantry, artillery, and mobile troops, while corps had virtually nothing. While the new BEF was organized for a European war, the flexibility of its all-arms divisions would have been good for a colonial war, and the corps could have also been useful for a large colonial war. Originally it had been thought that GHQ would command divisions directly, so the corps level had little authority. ²² There was only one real corps command in peacetime, while there were divisions enough for three corps. II and III Corps would have to be extemporized, and even I Corps would be fleshed out with

officers switched from other duties.

One retrograde step was the abolition of the Corps GOCRA, presumably because there were no guns for him to command directly, and anything else would step on someone else's toes. The re-organization of the army did not drive tactical changes; the two had been considered separately. There was still a field-gun brigade for each infantry brigade, and when Haldane abolished corps artillery he simply added that artillery to the divisions, so the fourth brigade was field howitzers. There was even a battery of heavy guns. But more divisional artillery, with howitzers and medium guns, required new command measures: one man could no longer control everything.

Chain of Command

At the divisional level, in 1907 a CRA (Commander, Royal Artillery) was appointed, a step that had been specifically rejected in 1901 and 1904. ²³ Furthermore, he was to be a brigadier general, equal in rank to the infantry brigade commanders. But his duties still lacked explanation, with the most recent list dating from 1902 and the old corps system. While having a CRA was the logical corollary of doubling the division's artillery strength, it was not accompanied by the creation of an adequate staff. Despite commanding more men than a cavalry brigade and more horses than the whole of the rest of an infantry division, a CRA had only a single staff captain (who was not even a fully trained staff officer) and a few orderlies. ²⁴ There were gradual increases, notably the addition of a brigade major, but they did not get at the root of the problem: the CRA was a fifth wheel.

It took five years to even settle a CRA's peacetime duties. His main task was training, but that was a tiny role. ²⁵ Divisional artillery training received one day a year at practice camp, and ranked behind both battery and brigade training. ²⁶ ([Appendix 2](#) has a discussion on training at the time.) Even this was undercut by the reluctance of some divisional commanders to allow their CRA real responsibility.

The CRA's wartime role was even murkier. Between 1902 and 1912, manuals gave little guidance, and the debate was mostly conducted in the pages of the *Journal of the Royal Artillery*. Authors freely interpreted the *FAT's* intent, quoting various sections to support their own views. Depending on the author's views, the CRA might be responsible for: integrating the artillery with infantry operations; reconnoitering artillery positions; controlling and directing fire targets; being a "consultative staff officer"; being at headquarters "at almost all times"; passing intelligence to the infantry; or keeping a reserve of guns under his own command. ²⁷

The CRA's wartime duties were finally settled in 1914, and exactly mirrored the artillery's position in the army: supporting the infantry, while never forgetting the artillery's subordinate position. How to do this was left unclear. The CRA might have some discretion, and maybe even some independence if the division commander allowed it. But his role was marginal, because many people still focused on brigades as the main tactical unit and thought the CRA should not interfere with his subordinates but only be a technical adviser to the division

commander. ²⁸

Even if he had some authority, a CRA's communications resources undercut him. ²⁹ Since the general view was that infantry brigades would be semi-autonomous, field gun brigades were frequently divided amongst them, with infantry and artillery brigades pairing off for semi-independent operations. Under these circumstances, artillery signalers might well be better employed linking with the infantry than with their nominal commander, the CRA. ³⁰ The lack of communications was even more crippling than the tiny staff. A CRA had precisely three signalers, three mounted orderlies, and two bicyclists. ³¹ To compound the problem, brigades had few communications resources of their own, and to economize the brigade commander was expected to stay with one of his batteries. ³² Indeed, brigades only had enough telephone cable to link their batteries; if they wanted to link to the infantry or the CRA, someone else had to provide the cable. ³³ The only source for help was the divisional signals company, which was already busy just connecting the infantry, divisional HQ, and the service units. One captain summed the situation up:

Neither the Signalling Manual nor Field Artillery Training give any information with regard to the establishment of communications between the [CRA] and his brigade commanders. "War Establishments" names a staff, with a strength difficult to know how arrived at and not equal to the equipment allowed by Mobilisation Store Tables. ³⁴

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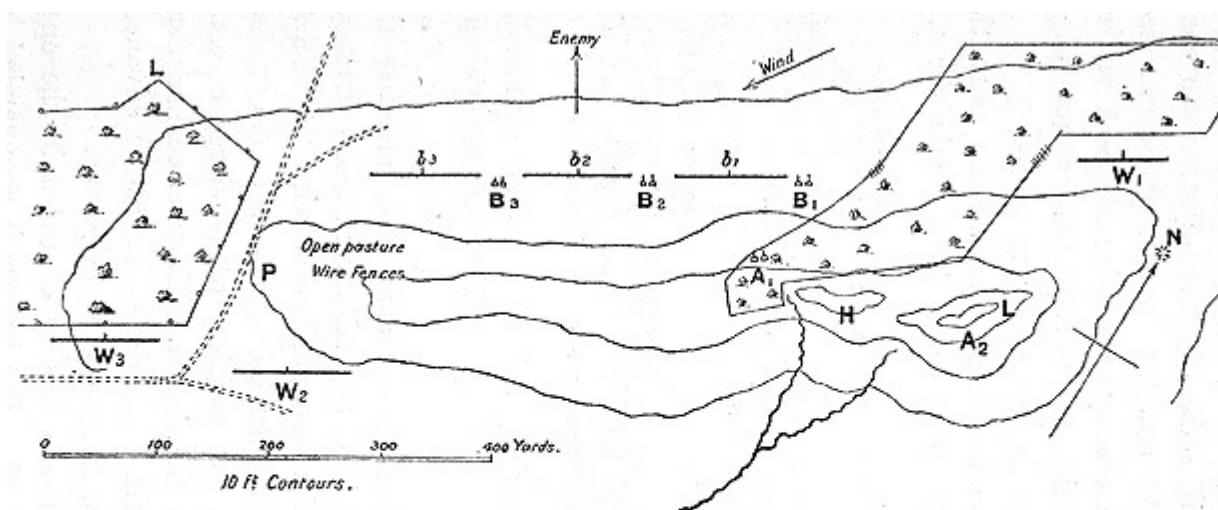


FIG. 58.—F.A. GUN BRIGADE IN ACTION IN THE OPEN.

- | | |
|---|--|
| A 1. Brigade commander, adjutant, brigade sergeant-major, and one orderly behind two gun limbers. | |
| A 2. Remainder of brigade staff and brigade staff horses. | |
| B 1, B 2, B 3. Battery commanders and staffs, each behind two wagon limbers. | |
| b 1, b 2, b 3. Batteries. | |
| H. Brigade heliograph in communication with C.R.A. | |
| L 1. Look-out man from W 1. | W 1, W 2, W 3. Battery wagon lines. |
| | LL. Look-out men furnished by flank batteries. |

This figure shows how the Royal Artillery expected to deploy before World War I. Guns are in the open, and communications within the artillery are quite simple. Liaison with the infantry is negligible, with the artillery expecting to be able to adjust its fire based on what it sees.

Source: H. A. Bethell, *Modern Artillery in the Field*

With it nearly impossible for a CRA to actually command his guns, it is not surprising that old-fashioned decentralization was so prevalent. Although the brigade was supposed to be the standard tactical unit, some officers skipped straight past the battery and stressed the two-gun section.³⁵ This was partly the result of brigades still being dispersed, for Treasury parsimony had delayed expanding barracks to allow for whole brigades to be stationed together. After three years of a barracks expansion program, only 27 of 50 brigades were united.³⁶ Brigade training suffered as brigade commanders found they could do little more than train the battery commanders; they assuaged their consciences by calling this their "essential duty."³⁷

The CRA at the division level was obviously weak, while the brigades were relatively stronger but still fairly weak. The only cohesive unit was the battery. While sections were the exception, many senior gunners expected the divisional artillery to be broken up and attached, one brigade of guns per infantry brigade, and sometimes one battery per battalion.³⁸ From 1907 (that is, as soon as Haldane's big divisions were finalized), artillery and infantry brigades were "affiliated" for training and exercises, which was simply the continuation of the old ways.³⁹ Tradition dictated that artillery "organization must depend directly upon that of the infantry," and this remained the underpinning of British artillery doctrine.⁴⁰ Indeed, regulations called for detaching batteries, "sections or even single guns in close support of the firing line" when fighting in close country, which may have been a reason for leaving batteries with relatively large signals establishments.⁴¹ Again, this would have not been necessary if there had been adequate signals equipment higher up, or if commanders had recognized that artillery fire was more important than the presence of guns.

There was a perverse benefit in splitting off the 18-pounders—CRAs would have only the howitzer brigade and the 60-pounder battery, precisely those pieces least suited for direct fire support.⁴² The CRA's signals resources could just cope with this limited force, and this may have been the unspoken intention. The other side of the coin was that these units required disproportionate amounts of signals to control, complicating the handling of the field guns, which became a bone of contention for more aggressive officers.⁴³ ([Appendix 3](#) is a contemporary discussion of many of these topics.)

Aggressive Use of Artillery

While "indirect laying ... *is the normal method employed in the field*," gunners were well aware that their job was infantry support, regardless of method.⁴⁴ There was too much talk of a "spirit of close support" (the parallel of the infantry's "spirit of the bayonet") or the artillery "entering the 'ring,'" and *FAT 1914* spoke of the artillery moving forward to support attacks and of "the moral effect of batteries advancing boldly."⁴⁵ Guns were felt to raise the morale of

nearby infantry, and boldness was good for gunners, too. ⁴⁶ The effects of enemy firepower on gunners' bodies, let alone their morale, were not mentioned. This was part of accepting the French doctrine, which itself marked the defeat of the firepower school within the British army. Gunners were overly willing to sacrifice the strengths of artillery—long range and indirect fire capability—when the infantry wanted the reassurance of guns deployed in the front line. They followed both tradition and what regulations suggested. ⁴⁷

In the Boer War, the British army had learned the effects of firepower, and afterwards adopted a firepower-centered doctrine for future wars. In only a few years this shift was overturned, and the emphasis was again on morale and maneuver. For the artillery, the switch back was most visible in the adoption of French-influenced doctrine, but the movement was broader. The cavalry kept the lance and saber. The infantry focused on morale and manpower—and especially on reinforcing the firing line by weight of numbers—rather than exploiting mechanical means of fire. The man was more important than the machine, marksmanship more important than machine-guns. In Britain, the ratio of guns to infantry was actually falling, while Continental powers were adding guns. The British relied upon the mobility of the guns themselves to compensate for their declining numbers. ⁴⁸

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Once again, shrapnel fit the situation and made the Royal Artillery look highly efficient. Shrapnel produced a high volume of fire: a battery of six guns firing at four rounds per gun per minute would fire 9,000 shrapnel balls in a minute. While no small achievement, this was thinking and acting on the infantry's terms: firepower was being defined in terms of bullets, not in terms of effect. The writers of the manuals clearly saw the artillery simply as bolstering the infantry, running the guns up into the line and blazing away. British infantry, like the Japanese, wanted guns deployed forward, even if that reduced their effectiveness. ⁴⁹ Many gunners were more than willing to play this role. An influential colonel wrote: "There is absolutely no excuse for artillery remaining idle in face of the enemy; if they cannot see him, they must push forward until they do, even if this entails their being used as machine-guns." ⁵⁰ Rising officers wrote that covered positions were for "annoyance rather than business," and the gunner's business was "the encouragement [of his own infantry] whether it be damaging the enemy or not." ⁵¹ *FAT* suggested a compromise—concealed maneuver into firing positions—but gunners were reminded that

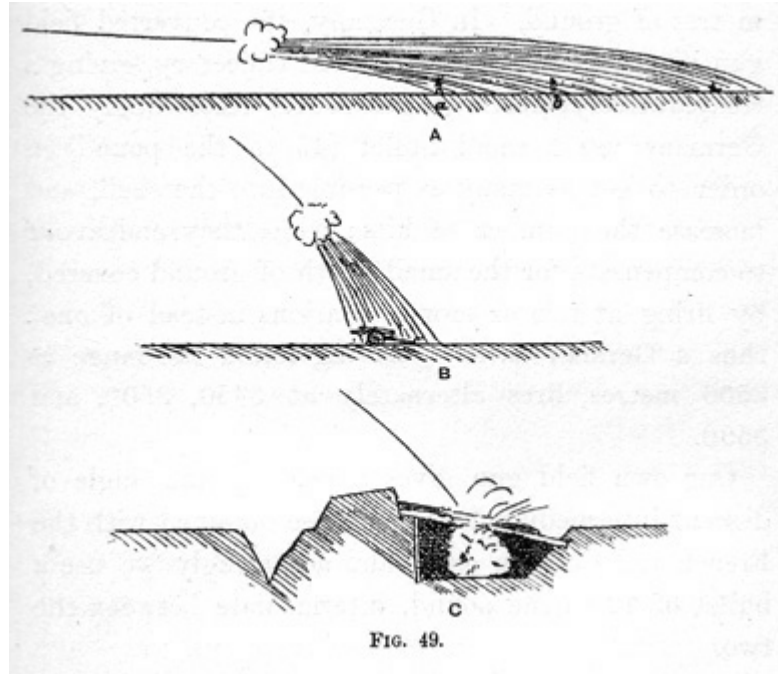
Concealment, both as regards position and man|uvre, must invariably be foregone for adequate reasons. To support infantry and to enable it to effect its purpose the artillery must willingly sacrifice itself. ⁵²

This was unambiguous and bold, and most gunners were happy with it. The alternative to the shrapnel/neutralization/infantry support school was that of artillery destroying the enemy. This would have cast artillery not only as a combat arm, but also as the decisive arm; it would have been a lurch to an extreme firepower (rather than morale/maneuver) doctrine. This idea was rightly rejected. There was no chance of the rest of the army agreeing, nor would the Treasury have bought the ammunition. It would not have made tactical sense. Artillery today (even with precision-guided munitions and air support) cannot utterly destroy an enemy. Even on paper, such plans take an immense amount of time, require very large forces, and hand the initiative

to the enemy, who can choose to sit under the shellfire, launch a preemptive attack, or withdraw. With the alternative unthinkable, the Royal Artillery accepted the role of a combat support arm. That was a reasonable role, but it still fell short of a solid combined-arms doctrine.

Field Artillery Tactics

Having settled their place in the army, it remained to determine the artillery's tactical role. Since future wars were expected to be mobile and fought for key points of terrain, instead of on a continuous front or in depth, the Royal Artillery took enemy infantry as the main target. Gunners would also fire shrapnel at enemy artillery, but since tests showed it was minimally effective against guns (and their shielded gunners), counter-battery fire was a low priority. The French doctrine was altered little despite the differences in equipment between the countries. Sudden, heavy shell concentrations created a momentary superiority in fire that helped the infantry move forward. Guns would be placed up among the infantry, firing at the same targets. Concentrated fire would shake enemy morale just before the infantry or cavalry charged. The safety distance, within which guns could no longer support the infantry, was set around 400 yards. (Wartime experience would prove this to be much too far, especially against machine-guns.) This was a by-product of optimizing the 18-pounder to fire shrapnel. Shrapnel had its best coverage with a relatively flat trajectory, but that flat trajectory meant a longer safety distance both near the guns (as the shells were ascending) and around the target where the shells were spraying their shrapnel balls. Despite the fact that artillery were supposed to help foot soldiers before the charge, the figure of 400 yards actually doubled the previous range at a time when other armies were reducing this distance. ⁵³ Inside the 400-yard range, the field howitzers would take over providing covering fire because their arched trajectory produced a narrower shrapnel danger zone. ⁵⁴ Meanwhile, the 60-pounders would be harassing enemy reserves and interdicting rear areas, or perhaps firing in enfilade from positions further along the front. ⁵⁵

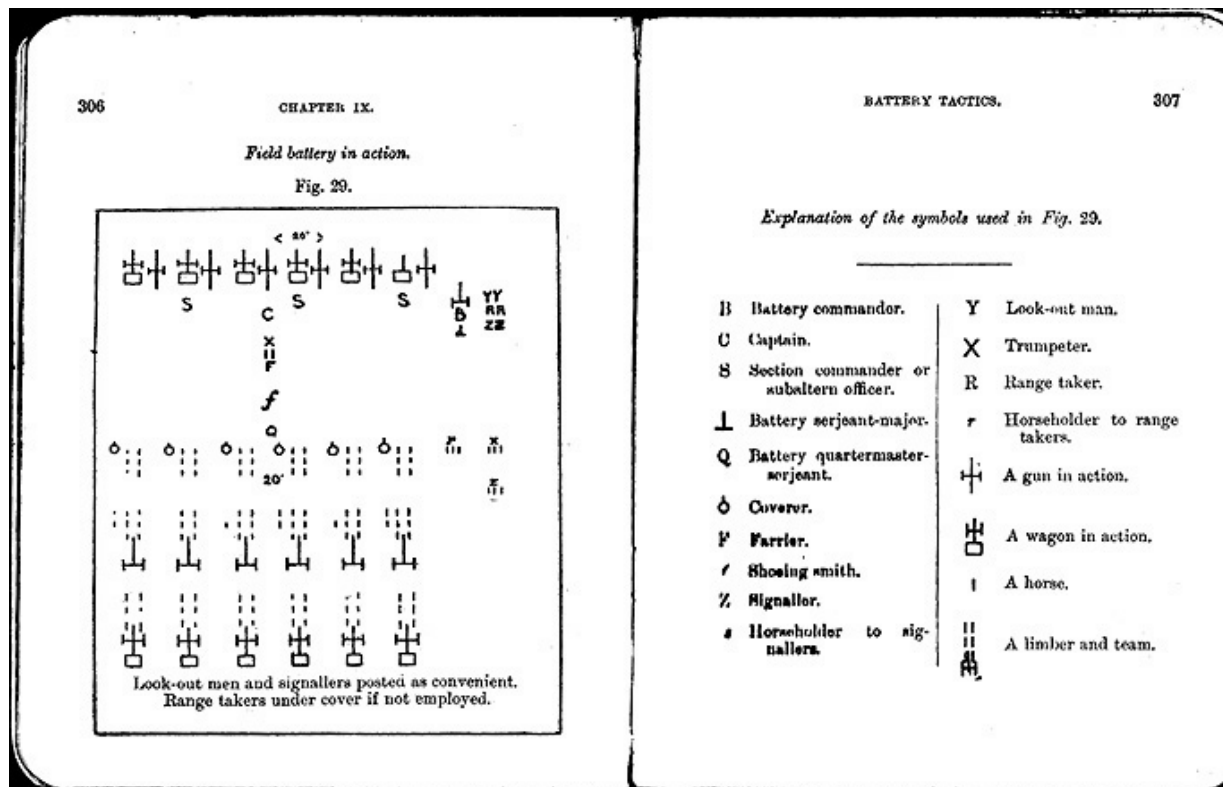


This shows two shells and two trajectories. "A" shows gun shrapnel, fired with high velocity and flat trajectory. These two factors cause the balls to fan out over a deep but fairly narrow area. Gun shrapnel was highly effective against men in the open, but much less effective against troops in cover or protection. "B" shows howitzer shrapnel coming down from a high trajectory. The arced trajectory limits the area covered by the balls, but also means that the balls can reach behind cover, such as a gunshield or wall. "C" shows high explosive shell penetrating cover. While clearly the most effective in these circumstances, it is also clearly less effective at covering open ground than shrapnel.

Source: H. A. Bethell, *Modern Artillery in the Field*

The main consideration in selecting firing positions was ease of fire. The shortages of communications equipment and personnel meant most guns had to deploy within sight of the enemy. Some officers saw little trouble with the lack of signalers, imagining batteries deploying in line under the brigade commander's eye, where he could manually (and digitally) indicate targets. ⁵⁶ In this spirit, officers were told that "view of the enemy was the second priority of a good gun position, behind only being in range." ⁵⁷ It was possible even to complain that howitzers, using covered positions at practice camps, were firing from "too far back." ⁵⁸ This ignored the simple fact that howitzers' trajectory made them harder to handle in direct fire than guns. Manuals defined three categories of positions: "open," "semi-covered," and "covered." ⁵⁹ An open position is self-evident, and a covered position kept the battery and its muzzle-flashes concealed; the semi-covered position was a compromise that kept the guns hidden, but that rendered evidence of their position (muzzle flash or dust) visible. No official preference was expressed, but when the *FAT* noted that covered positions "increase difficulty of control, frequently necessitating artificial means of communication ... and the use of plotters," the implication was clear. ⁶⁰ Such positions were not for ordinary use—not least because few batteries could find, let alone use, a plotter—and writers struggled to find any reason for them. Counter-battery fire was already considered the likeliest, but was a very low

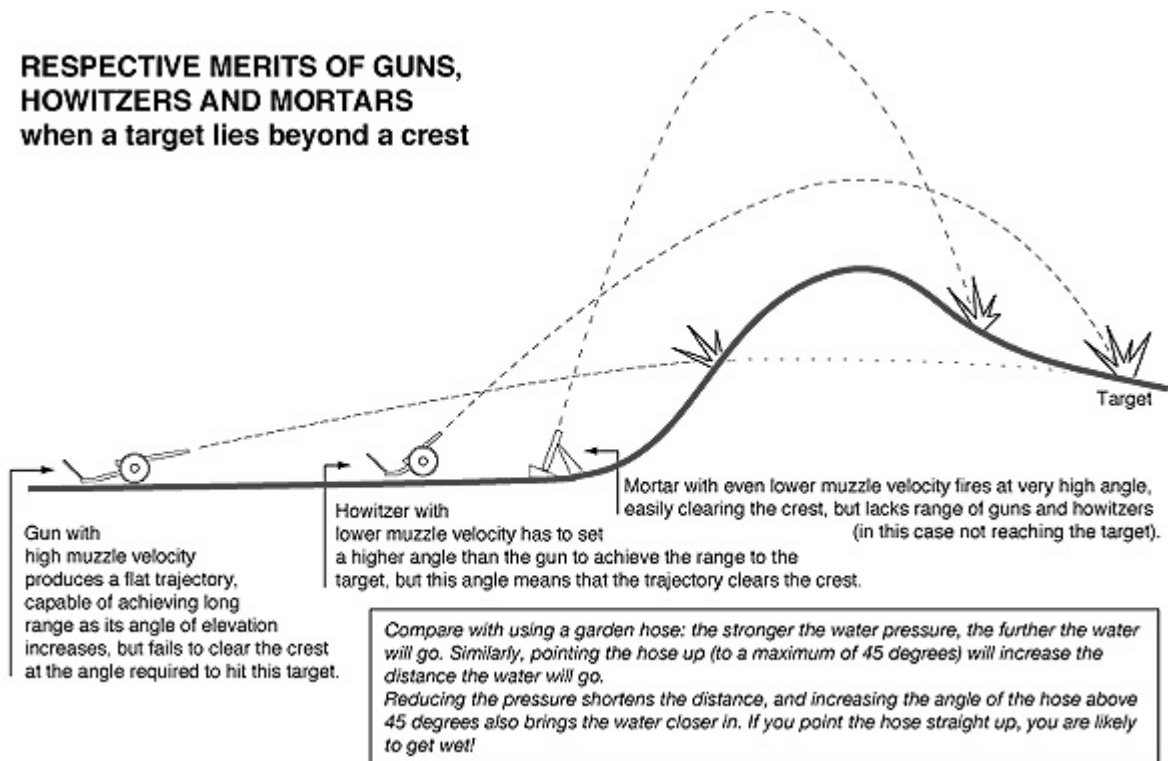
priority and sometimes could be performed from open positions. ⁶¹ While few officers devoted much thought to destroying enemy guns through shellfire, some of the same results could be achieved by drawing enemy fire onto exposed batteries, and off the similarly exposed infantry. If the effects were painful, they were expected to be temporary because the British infantry would surely capture the enemy guns. The heavy battery was seldom expected to engage over open sights, but it at least had double the number of signalers (it was expected to work in two sections) and was more familiar with indirect fire. ⁶²



This shows a simplified, but essentially accurate, concept of how batteries were supposed to deploy for action. The guns were to be twenty feet apart and the wagons ten yards behind—meaning most of the battery was in the fragmentation radius of an HE shell.

Source: *Field Artillery Training*, 1912, 306-7

RESPECTIVE MERITS OF GUNS, HOWITZERS AND MORTARS when a target lies beyond a crest



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Diagram 2: Artillery Trajectories.

Source: Courtesy Royal Artillery Institution

Field Artillery Equipment

At least these tactics fit well with the equipment available. The most common field piece was the 18-pounder field gun, a modern quick-firing (QF) weapon with a gunshield. A division had 54 18-pounders, organized in three brigades of three batteries each with six guns. This was the world's heaviest field gun, firing the heaviest standard shell, and it had been adopted for its excellence in firing shrapnel. Shrapnel was its only round—high explosive had been specifically rejected—but partial compensation came from the explosive effect of the large shrapnel round. Adding a bit of smoke to shrapnel had been debated, but technical difficulties and conservative thought doomed it (it was deemed a "cuttlefish policy, too fanciful for our consideration").⁶³ The 18-pounder was built for a very flat trajectory, making it admirable for sweeping shrapnel through targets in the open. To abet the flat trajectory, the carriage limited elevation and hence range; this would not be a problem for its expected direct-fire missions, and by saving weight the design increased mobility. The sacrifice of range was another part of the shrapnel obsession. Shrapnel lost much of its effectiveness at long ranges, so the British decided to give up long range rather than give up shrapnel. The flat trajectory also limited the guns' usefulness against targets in cover. Buildings were not so much the problem as entrenched infantry, or even gunners behind gun-shields.

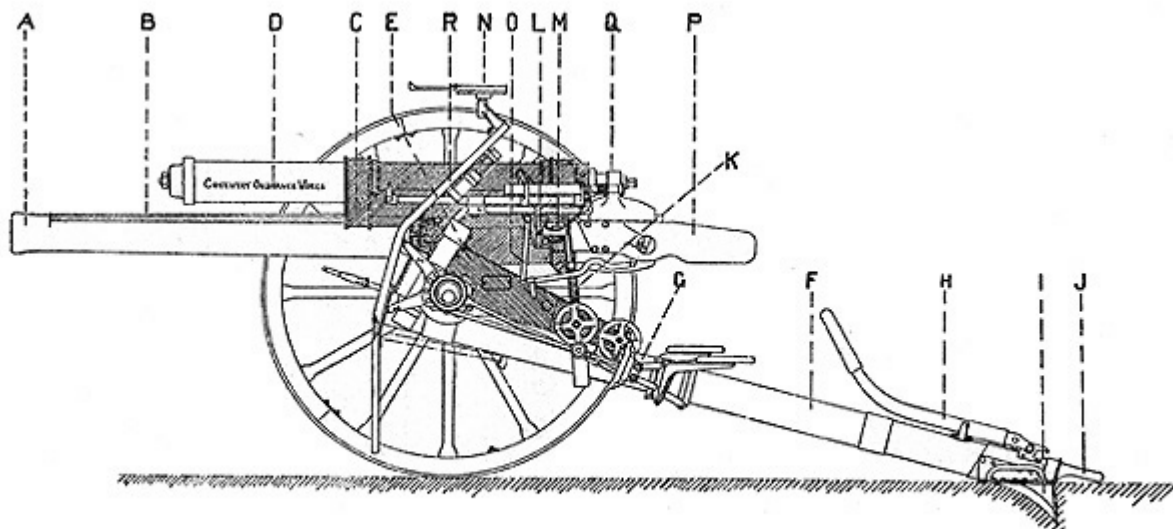


FIG. 1.—18 PR. Q.F. GUN.

The 18-pounder was a very modern field gun in 1914, having only been adopted in 1909. The British had not produced enough to equip the Territorial Force with 18-pounders, having to rely on the outdated 15-pounders which did not have full pneumatic recoil.

Key:

- A. Gun tube
- B. Recoil guides
- C. Cradle
- D. Recoil spring case
- E. Upper carriage
- F. Trail
- G. Brake arms
- H. Traversing lever
- I. Spade
- J. Trail eye
- K. Elevating screw
- L. Rocking bar sight
- M. Clinometer
- N. Dial sight
- O. Firing lever
- P. Guard (prevents crewmember from catching arm)
- Q. Horn connecting gun and buffer
- R. Gun shield

Source: H. A. Bethell, *Modern Artillery in the Field*

These targets were why the Royal Artillery adopted a light field howitzer, of 4.5-inch caliber, firing both high explosive (HE) and shrapnel shells. Infantry divisions had one brigade of three

batteries, a total of eighteen howitzers. They fired HE and shrapnel, which had been added since the Boer War when howitzers were issued only HE. The shrapnel shell was useful since the howitzers' high trajectory meant they could shell entrenched troops, or gunners behind gun-shields. The HE round was intended to destroy minor field works and buildings. Conservatives argued that, because howitzers had HE shells, the field guns did not need any. However, shrapnel was now the howitzers' dominant munition; the HE round was designed with similar ballistics to shrapnel (and to be useful for ranging) when a different design would have produced more explosive effect. ⁶⁴ Optimists claimed howitzers could flush enemy troops from cover, getting them into the open and making them more vulnerable to 18-pounder shrapnel. Not only was this unlikely against a steady opponent, but it required lots of time and ammunition, the latter being sure to be in limited supply. Howitzers were expected to operate in direct support of the infantry, so the 4.5-inch howitzer had a gun shield, and gunners practiced point-blank fire to defend themselves against charging infantry.

The last artillery type in the division was the 60-pounder, deployed in only one four-gun battery. It was a modern piece, but since it was intended only for long-range fire it lacked a shield. 60-pounders carried mostly shrapnel, but had some HE. It added a useful capability to the division but was essentially bolted on, lacking a clearly defined role. The heavy battery did not fit into combined tactics and was essentially for opportunity targets. It was really a carry-over from the Boer War, when a little long-range shelling often dispersed groups of Boers.

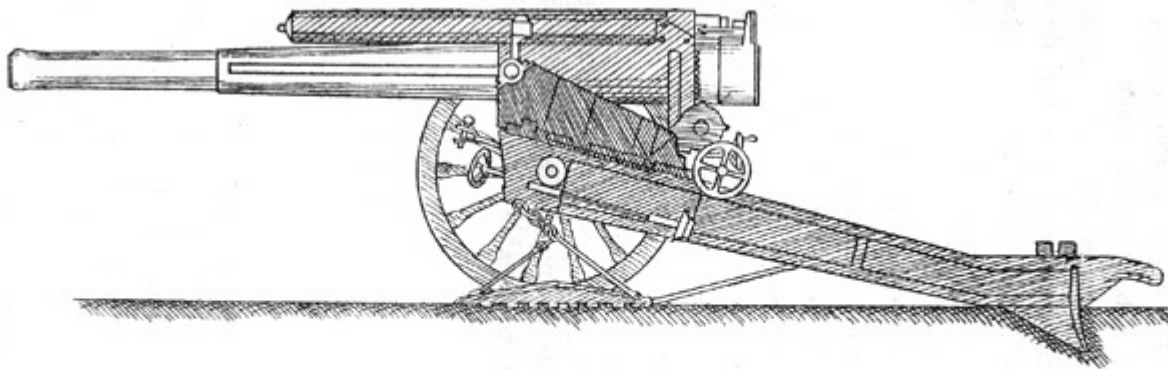


FIG. 16.—60 LB. HEAVY FIELD GUN.

The 60-pounder gun was added to the British artillery because of experience from the Boer War. Heavy guns had proven adequately mobile and useful for sniping at long distances. Both of these factors would prove to be true in World War I, but many more uses would be discovered for the 60-pounders.

Source: H. A. Bethell, *Modern Artillery in the Field*

As a whole, then, British artillery weapons were optimized to fight an enemy who stayed in the

open and at moderate to close range. There was no good answer for men in cover. Few guns had long range. If the enemy were in close terrain, weak communications meant guns had to be pushed forward into direct fire positions. The final weakness was that of considering British artillery in isolation, ignoring the effects of enemy artillery. In this regard the Royal Artillery were simply putting their heads in the sand. Because they could not seriously hurt the enemy artillery, surely the enemy could not hurt the British. This was a "lesson" of the South African war; not a single Boer gun was destroyed by British shellfire, and the Boers had too few guns to harm the British artillery. Moreover, once gun shields were fitted and protected the crew from shrapnel and small-arms fire, it appeared that any existing problems had been solved. Of course, the lesson was not the right one, and the error was compounded by the focus on shrapnel.

The Royal Garrison Artillery

The exception to the field artillery's relentless focus on close support was the Royal Garrison Artillery. It had the quadruple responsibility for coastal artillery, siege artillery, mountain artillery, and the few heavy batteries. Most of these duties did not require horses, and garrison artillerymen put the time saved from stable duties toward improving their proficiency at long-range gunnery. Garrison artillerymen also had a three-month gunnery course, while their Mounted Branch counterparts spent only one month in training. ⁶⁵ In November 1913, an RGA major was laughed at for suggesting that batteries take a thermometer and barometer into the field, and the RFA lecturer replied that he could not agree with a "plea for greater [predicted] accuracy ... the gun is the best range-finder, better than all the scientific instruments in the world." ⁶⁶ In other words, the best thing to do was blaze away and correct your fire as you went rather than bothering to try and hit with the first shells. The major also pointed out that the FAT mentioned correcting for environmental conditions, but then did not say how to do so. The only RGA units attached to the field army were the 60-pounder batteries, and we have seen how poorly they fit into the infantry division.

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The RGA also fielded siege artillery, all of it howitzers. For a siege, howitzers were more useful than guns. Not only did their shells plunge down, getting into trenches and threatening to crack forts, but because howitzers had a lower velocity, their shells could carry more explosives. (The lower velocity put less strain on the shell, which could have thinner walls and thus carry more payload.) The British army used 6- and 9.45-inch siege howitzers. The 6-inchers were moderately useful, although nearing obsolescence. Their range was limited and they lacked a robust recoil mechanism. There were only sixteen in the whole British army, with a wartime organization of two brigades each of two batteries. The 9.45-inch howitzers were an emergency purchase from the Austrians when it appeared the British might have to besiege Pretoria and were never fired in battle. They had very short range and very poor mobility; there were only eight of them, enough for one brigade of two batteries. On the whole, the British army had too little siege artillery and it was too light in caliber. While the French were even worse, having virtually no siege weapons, the Germans had both examined modern fortresses (and thus obtained more and heavier weapons) and had attached good medium-caliber weapons to their field army.

Siege Artillery in the Field

So far we have only looked at mobile operations, either encounter battles or hasty attacks. The British army compartmentalized its thinking very thoroughly, and not only defensive operations but deliberate attacks and sieges received virtually no attention. There was no anticipation that siege artillery would actually participate in a war. Although it might "be added [to the Expeditionary Force] as circumstances may demand," the *Field Service Pocket Book* did not mention siege artillery at all. ⁶⁷ This is mildly curious. Though the army had very little siege artillery, it had participated in the 1913 maneuvers. ⁶⁸ (There was one battery on each side. Because the RGA did not keep horses in peacetime, civilian carters were hired to move the batteries. The batteries had little impact on the maneuvers, neither the plans nor the outcome. They opened fire on each other, and the judges ruled that each battery destroyed the other with the first salvo. It is tempting to conclude that the rest of the force wanted to get the siege artillery out of the way). ⁶⁹ The tactical role of siege artillery was also nebulous. One suggestion was destroying obstacles, although this was never practiced on the firing ranges. ⁷⁰ If not shelling obstacles, the mission changed to fire against personnel: siege artillery were issued shrapnel "as it is the personnel that has to be overcome before the position, whatever it may be, can be captured." ⁷¹ Thus siege and field artillery had very similar duties, and that narrowed the circumstances in which siege guns would be needed (and when they would encumber the army) to the point that its only clear task was driving in the outworks of a fortress. For this purpose, the 6-inch (medium siege) howitzers, plus whatever odds and ends were scraped together, would be deployed. Their specific goal was to make sure The Siege Train was only deployed for major sieges and thus did not encumber the BEF. ⁷²

Siege artillery had separate command arrangements, with separate brigades but under a "commander of the besieging artillery." Communications were a sticking point: three siege brigades existed, but the army had only enough resources to link two, the Royal Engineers' signalers being expected to do the rest. ⁷³ It is not clear to whom the brigade commanders answered during mobile operations, but presumably directly to GHQ unless assigned to a division. Siege artillery was not even part of the BEF; technically it was part of The Siege Train. Rumor had it that because siege guns could not be landed across a beach, which might be necessary for a colonial campaign, it could not belong to the Expeditionary Force. ⁷⁴ But if the area of operations was so remote that the Expeditionary Force had to land (and apparently then be supplied) over a beach, they were hardly likely to need siege artillery anyway. If this argument was really heeded, it is sad commentary on the British army.

If operations were somewhere between a siege (it seems the British still thought of formal sieges, complete with *parlementaires* and drummers) and open warfare, there were no artillery command arrangements. The army was sure it would not happen, so nothing more than paper generalities were needed: methodical progress "should make the CRA's task of fire-control somewhat easier." ⁷⁵ A slower advance would ease strains the communications network, and strengthen the CRA's role. ⁷⁶ This suggests that decentralization and detachment were recognized as harmful to the artillery's advantages, for central control would allow employment "as required by the exigencies of combat." ⁷⁷ But the manuals were silent—in hindsight eloquently so—on just how to do this.

This gap between siege and mobile warfare was not the only one existing in the British army. Haldane's reforms had created real Army Corps, but without artillery commanders anywhere above the division level. The last chain of command for artillery was laid out in 1902, under the old corps system, before QF guns were adopted or Haldane reorganized divisions. It is unclear why this system was dropped (and not revived until 1916), but perhaps it was felt the larger combined-arms divisions needed less support from above. Anyway, there was little help available; GHQ and corps had only their own staffs and administrative troops. On the other hand, there was very little artillery outside the divisions to require handling. The Siege Train was only for sieges. The only problem was the medium siege weapons that might or might not be deployed.

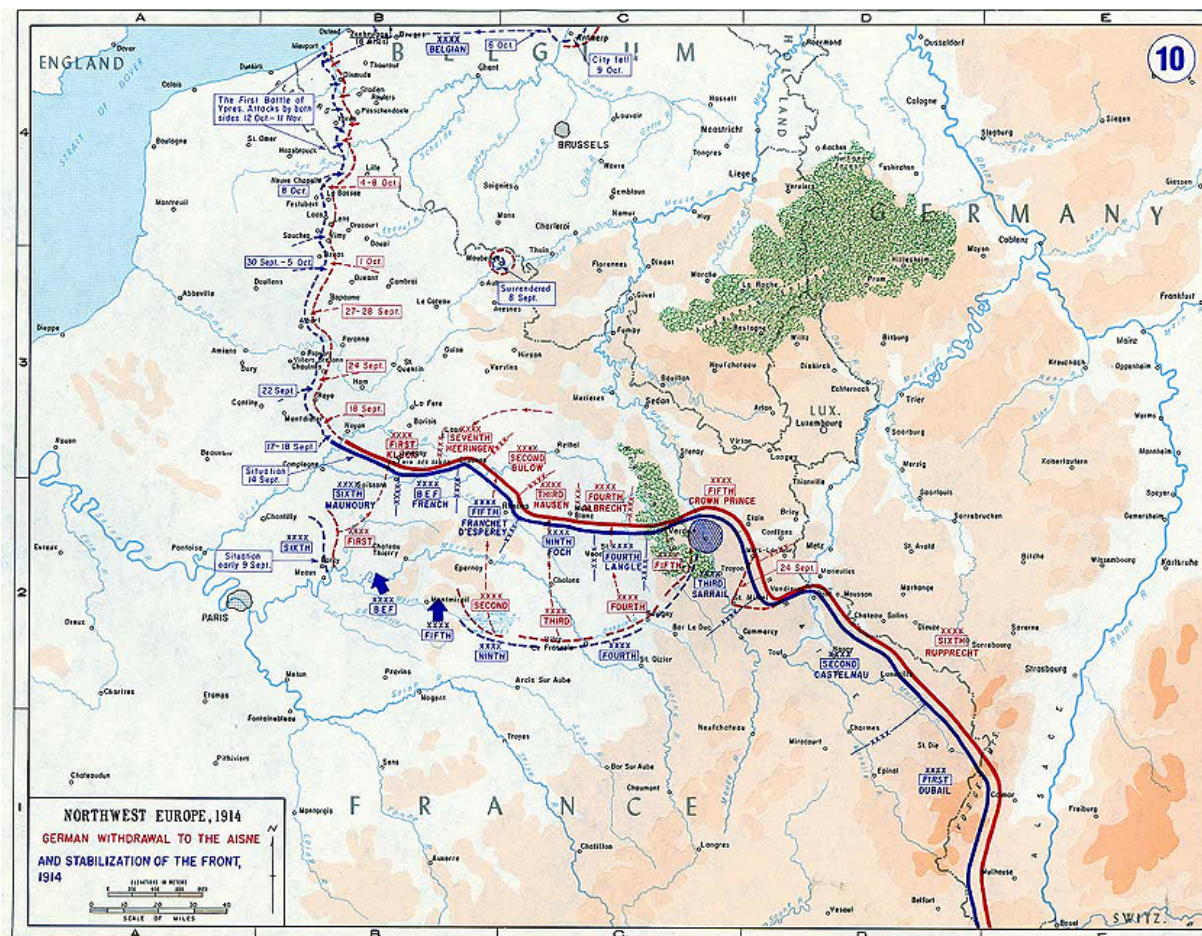
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With virtually no weapons to command, it was not unreasonable to have only an "Artillery Adviser" at the corps and GHQ level, without so much as a clerk to help with paperwork, and leave his role undefined.⁷⁸ The job did not need a lot of preparation, and the men would be appointed at the point of mobilization; until then the only artillery staff officer below the War Office was the "Staff Officer for Artillery" at Aldershot.⁷⁹ He was hardly the modern model of a staff officer. His wartime position was neither staff officer nor Artillery Adviser, but rather CRA for the Cavalry Division, and his staff would come from the Riding School. These men followed the nineteenth-century model of staff officers and were gallopers, not planners. With these presumptions, it was reasonable in 1912 to consider the brigade the higher level of command, and to not mention artillery officers above the division level. Larger forces could simply be noted as having "no CRA."⁸⁰

Conclusions: The Pre-war Artillery

As discussed above, there was no framework for commanding artillery above the divisional level, and only a weak one for handling the divisional artillery as a whole. It was assumed that artillery would be entirely subordinated to the infantry in maneuver battles, and maneuver battles were the only ones that had been even halfway-adequately studied. The Siege Train was for formal sieges, but was too small both in numbers and sizes of guns to be truly effective. There were no answers for the problems that would arise in 1914. Pious hopes were voiced for centralized command in set-piece attacks, at least recognizing that it was necessary. Though correct in theory, there was no way to make it happen. Communications were inadequate for both methodical attacks and mobile actions alike, and were perhaps worse in set-piece attacks, which were not suitable for visual signaling and threw the whole load on telephones and runners.

Underpinning the artillery's role was its proper subordination to the infantry, but this principle was taken too far and the artillery was expected to do more of what the infantry did and was placed up amongst the infantry. As a result of this thinking, its guns and shells were optimized for this task. This ignored the advantages of artillery: long range, indirect fire capability, and heavy firepower. There was not enough communications equipment to implement a centralized artillery command system, so decentralizing and working closely with the infantry and cavalry was a necessary compromise. The mistake lay not in accepting it as a temporary condition, but in accepting it too enthusiastically and thus neglecting what made artillery different.



Map 11. Western Front, September-November 1914. This map shows the locations of the BEF's main battles of 1914.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

1914: The Test of Battle

These were the principles in place in 1914, and the Royal Artillery stuck with them as long as they could. (Map 11 shows the Western Front in 1914 with the sites of major British battles.) The BEF took its integral artillery to France, and nothing else; nobody wanted The Siege Train. But intentions were one thing and real life another. Within days of the first battles, the BEF requested artillery reinforcements. The first siege batteries soon embarked and saw action in mid-September at the Battle of the Aisne.⁸¹ In addition to Siege Train elements, various guns were scraped up from coastal batteries, depots, and testing grounds.



J Battery RHA, 1914. These guns are deployed in open positions, typical of the early days of the war, and still useful from time to time later. The problem of being in full view of the enemy is obvious. Open positions were useful again in mobile warfare in 1918. When the British were retreating, the German communications were too weak to pass along news of where British guns were, so the German infantry had to fight the guns alone. When the Germans were retreating, much of their artillery had been destroyed or captured and the communications network was even weaker.

Source: IWM photo Q60751.

Horse and Field batteries operated as anticipated. They were administered as brigades and paired with infantry or cavalry brigades, but they fought in batteries. ⁸² Field howitzers were also handled in this way. Direct fire was frequently used. Sometimes a gun was pushed forward to blast a given German position, or a howitzer to demolish a building. ⁸³ Gunners did not hesitate to go forward, nor did the infantry hesitate to ask. Indeed, gunners were too willing to agree; at Le Cateau, the 5th Division deployed its guns in full sight of the Germans, and had to abandon half of them because German fire prevented the horse teams from coming forward and removing them. The 3rd Division, fighting next to the 5th Division, used safe positions on the reverse slope. However, because communications over the ridgeline were difficult, the 3rd Division's artillery was somewhat less effective, although it survived to fight another day. ⁸⁴

The BEF saw little action on the Marne, but the intersected country of the Aisne caused problems. Because of the pre-war emphasis on shrapnel, and their flat trajectory, British field guns had great trouble in the narrow valleys. They either had to be deployed further forward than they wanted to be, or so far back that shrapnel lost its effectiveness. 18-pounders generally stayed up with the infantry, with CRAs responsible more for supply than tactics. Communications were stretched to the breaking point (there simply was not enough telephone cable), and senior officers often found themselves shuttling around, maintaining contact with their subordinates, rather than commanding. One ADC in the 3rd Division noted that "anyone of us who wanted to consult any [divisional] staff ... had to drive or ride over to see him, often a matter of miles." ⁸⁵ Open positions were all that was available, and they were employed, regardless of the cost. Guns were used as infantry reinforcements, a reminder that the army saw them as simply another kind of bullet-deliverer, and also demonstrating the infantry's low firepower. ⁸⁶ As Alan Brooke later wrote, there was no combined-arms planning; the infantry decided what they wanted, and others did their best to conform. ⁸⁷ Howitzers, immensely useful in this terrain, were in short supply. They could fire from cover, had longer range than the 18-pounders, and their HE was effective regardless of range. When the first 6-inch howitzers arrived, they were immediately attached to divisions. Nobody tried a central firepower reserve, possibly because the communications network could not handle it, but there were also problems establishing a legal command authority.

This pattern held as the Germans were forced back and the BEF sidestepped to Ypres. Infantry and cavalry brigades fought with 'their' attached guns, while the CRAs commanded 60-pounders and howitzers. One CRA had command of only two batteries for "special tasks." ⁸⁸ Sometimes field howitzers were given to infantry who had a particularly strong position to attack. That gave the attackers a firepower boost, but at the expense of robbing other units, which went without until the batteries were redistributed. Occasionally batteries were used in quantity, as when Sir John French supervised the concentrated fire of all five heavy batteries on various German batteries. ⁸⁹

But with no mechanism for concentrating fire across divisional boundaries, this sort of concentration was extremely rare. ⁹⁰ CRAs had to personally develop cross-fire between divisions or, thanks to the dispersion of their division's guns, even within their own divisional sector. ⁹¹ Without an artillery chain-of-command, it required a corps commander—or, indeed, Sir John French himself—to make it happen. With their wide discretionary powers, corps commanders could centralize artillery. Sir Douglas Haig, then commanding I Corps, on 18 September delegated to Henry Horne (his Artillery Adviser) "the organization of the artillery fire and the co-operation between artillery and aeroplanes." ⁹² Horne spent much more time working with the RFC than organizing artillery fire. Every clear day he personally went to the aerodrome and took reports from pilots; then, lacking legal authority as a commander, he had to pass suggestions to the CRAs. Haig formed a "Special Artillery Group" in I Corps, a mixture of field artillery, siege howitzers, and medium guns, which "acted directly under [Haig's] orders," not Horne's. This was an encouraging example of a centralized fire reserve, but Haig had to do this personally rather than being able to delegate to a subordinate. Having to directly command his personal artillery reserve must have taken some of Haig's time away from other duties. Ad hoc arrangements might work, but they did not establish a system that

could be used outside I Corps.

As movement slowed in October and became nearly static at Ypres, the artillery adjusted. Defensively, the artillery pulled back to perhaps a mile behind the infantry, so that it became unusual for guns to be deployed forward with the infantry. ⁹³ The key moment seems to have been when the infantry entrenched. Once the position of friendly troops was fixed, the risk of friendly fire dropped, and if shells did fall short at least the entrenchments reduced the effects. Liaison, therefore, did not have to be quite so intimate, and telephones or visual signaling could safely be employed. Communications also broke down as the infantry suffered heavy casualties. Infantry battalions could no longer hold as much frontage as 'their' guns could support. Eventually, the front was organized into sectors, with the artillery under the control of whatever infantry force happened to hold that sector. ⁹⁴ However, there was still considerable rigidity in the command structure: guns would only fire on their sector. Sectors also led to the development of "SOS" fire. At a signal (typically a flare) from the infantry, the sector's guns fired for a given period of time. The main purpose was to provide instant fire support so that a unit under attack did not have to call back to HQ and wait for fire support to be organized. One great advantage of using flares or other pyrotechnical signals was that they also worked at night (one of the first terms for SOS fire was firing on "night lines"), and they also worked when shellfire had cut phone lines. The link between the infantry and artillery within a given sector also meant that when infantry left the line, the guns did too, thus withdrawing their firepower. Certainly the gunners could use some rest too, and during the shell shortage having more guns available did not necessarily mean that more firepower was available. ⁹⁵

There was a commendable effort to find and disseminate the lessons of what worked best. (Appendix 4 has an extremely early example.) One lesson about forward positions was learned from the early battles. These were now frowned upon, and were considered "emergency" measures with "no advantage over covered positions." ⁹⁶ Some lamented that "concealment has been forced upon our artillery," as if this had not happened in South Africa. ⁹⁷ Batteries generally fought together, although guns might be detached. Heavy artillery was the exception, and 6-inch howitzers were doled out as needed to smash houses or batter German entrenchments. ⁹⁸ With field guns still tied to the infantry, CRAs had only the field howitzers, the 60-pounders, and any attached heavy artillery. ⁹⁹ This was within their communications means, and the networks gradually improved as more telephones and cable arrived. Over time, brigades were connected to the CRA so that defensive fire could be shifted where it was most needed, if only within divisional sectors. I Corps even scrounged enough telephone cable to link its CRAs to each other, but still not to the Corps Artillery Advisor. ¹⁰⁰

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Communications problems led to other difficulties. Without enough cable to link batteries, coordinated fire was impossible. In theory, the BEF's central position in the Ypres Salient allowed a central artillery group to support infantry anywhere around the perimeter, but the advantage could not be exploited. The problem was quickly recognized, and more communications equipment (cable, telephones, and switchboards) was sought. Unfortunately, it only trickled out, and supplies at the front were always short. ¹⁰¹ Even if the communications problem had been solved, the idea of centralizing command was new. Scarcity often causes

centralization to allow efficient use of the resources, but this also depends on adequate and timely communications, which circles right back to the original problem. As it was, the clumsy and brittle artillery arrangements worked, but without better signals the artillery could do no more.

The Artillery Advisors (AA) at corps HQs still lacked any purpose, and tended to be used as spare senior staff officers. ¹⁰² Even for multi-division attacks—when central planning might be expected—AAs were not involved. An Adviser could watch divisions in his sector preparing an attack without the slightest conception that he should take part, even when he knew "there was not enough preparation or organization." ¹⁰³ Instead, artillery support "was left to the discretion of the divisional commanders." ¹⁰⁴ There was great concern not to infringe upon commanders' authority. Perhaps this was a throwback to the "small wars" around the empire, when a force commander had virtually unlimited authority, or was a recognition of the squabbles and jealousies of the peacetime army. Whatever the reasons, division commanders were generally treated gingerly by both corps HQs and GHQ. ¹⁰⁵ This was felt further down as well. Since brigades had traditionally been the main artillery unit, CRAs generally were too reluctant to give orders and coordinated or liaised instead of commanding. When the BEF was fighting a moving battle, this was not a big problem. Since signals could not cope with mobile conditions, artillery had to be de-centralized. It was not just because of the shortage of signalers and cable, although that contributed to the situation. Key technologies simply did not exist, and the same troubles would be experienced in 1918. More important, there was no ability to change plans according to conditions, no way to assert command after operations centered on Ypres. There was a tenuous artillery chain of command inside the division, but outside the division there was nothing, and inter-division co-operation depended on individual generosity or on the already busy corps commanders finding time.

The pre-war ideas regarding artillery's role were also changing. Direct-fire shrapnel was not the panacea it had been built up to be, nor was killing men the main problem. Targets, whether human or material, were under cover. First they had to be located, then hit. If they could be hit, shrapnel did not do enough damage. The lack of 18-pounder high explosive shells was keenly felt, and test batches from the factories were rushed to the front. New tasks arrived as well. Before the war, the artillery had been asked to "preserve the infantry's mobility," which had meant suppressing the enemy infantry for a few minutes. Now it meant cutting barbed wire and destroying machine-guns before an attack. Gunners also had to demolish defenses, both trenches and strongpoints. Even the RGA, the siege artillerymen, had not practiced on such targets, so the artillery had to start from scratch. Shells were too scarce to waste on experimenting. Experience came from battlefield results, but cost lives when things went wrong.

Even worse for the long term, the impression developed that trenches and barbed wire were the obstacles, rather than the German infantry, which they sheltered and protected. The emphasis in late 1914 was changing from suppressing the German infantry to destroying German positions, almost forgetting the troops that happened to be inside them. This erroneous view would increase in 1915 and peak in 1916, but origins were clear in late 1914. It is doubly remarkable that a morale-focused army switched to this view so readily and without comment.

Counter-battery firing was more important than ever, but was less urgent than other problems. The Germans had their own shell shortages and communications problems, and their artillery was not yet the defensive factor it would be. The priority for the Royal Artillery remained infantry support, which was felt to be offensive, while counter-battery work was defensive and thus viewed as inferior. ¹⁰⁶ Furthermore, shells were precious and had to be used on the most dangerous target, which was usually the German infantry and machine-guns. One very progressive development was the use of aircraft in conjunction with artillery. The technology was primitive even by the standards of 1918, but the army realized this was a critical area to develop. Everybody worked on the problems: troops in the field, GHQ, and the War Office.

The end of the year saw the first breathing space for the BEF, the first pause for thought. In the roar of battle there had been little time to consider what should be done differently, and responses to changing conditions were haphazard. Nobody had any experience whatsoever in handling such a large force in the field. Experience from the Boer War was of little use, as officers with command experience from that war were now commanding larger units than they had before. Given the lack of time for reflection, it should be no surprise there was little change in opinions. Artillery still focused on supporting the infantry and cavalry (the combat branches), as it would throughout the war. Some of the most outdated views were abandoned. Artillery was no longer viewed as just more infantry firepower, and direct fire was quietly dropped. But these changes were forced on the BEF, instead of being adopted voluntarily. Other problems could not be solved yet, if ever, and of course solutions were needed immediately. Quick solutions tended to be along traditional lines, and until these were exhausted few called for radical change. After all, British arms had been moderately successful in 1914, and could expect to be so again. After valiant, if not entirely successful, opening battles, the "Miracle of the Marne" started a sustained Allied counter-offensive. Even at Ypres, the Germans had thrown in their last national reserves, and the Allies held. (Ypres is often presented as a British victory, but the French role is commonly under-reported.) While the BEF could not claim to have solved trench warfare, they had yet to really try. Until they made a serious effort, they would not know whether their methods would be successful, and there would be no change until after the attempt had been made. Under the circumstances, they evolved rather than revolutionized.

Notes:

Note 1: Thomas Pakenham, *The Boer War* (New York: Random House, 1979). [Back](#).

Note 2: R. H. Scales Jr., "Artillery in Small Wars: The Evolution of British Artillery Doctrine, 1860-1914" (Ph.D. dissertation, Duke University, 1976), 288. For examples of earlier organizations, see B. P. Hughes, *Open Fire: Artillery Tactics from Marlborough to Wellington* (Chichester: A. Bird Publications, 1983), 28, 143. [Back](#).

Note 3: Sir Charles Callwell and Sir John Headlam, *The History of the Royal Artillery from the Indian Mutiny to the Great War*, vol. II (Woolwich: RAI, 1937), 133. Hereafter cited as

Headlam, History. [Back](#).

Note 4: For details see Anon., "Record of Work Carried out by the Artillery Branch of the Head-Quarters Staff, South African War, 1899-1902," *Proceedings of the Royal Artillery Institution* (hereafter PRAI) 30:7-9 (1904): 306-12. [Back](#).

Note 5: The RGA (manning the heavier guns) were split up even more. E. G. Nicholls, "The training, organisation and equipment of Companies of the Royal Garrison Artillery with medium guns, and howitzers, and their tactics in future field operations," *PRAI* 28:2-3 (1902): 98. [Back](#).

Note 6: Sir Charles Callwell and Sir John Headlam, *The History of the Royal Artillery from the Indian Mutiny to the Great War*, vol. I (Woolwich: RAI, 1931), 254-5. [Back](#).

Note 7: Headlam, *History*, vol. II, 26. [Back](#).

Note 8: Ibid., 46. [Back](#).

Note 9: Ibid., 345-6. [Back](#).

Note 10: W. H. F. Weber, "The Development of Mobile Artillery 1914-1918," *Journal of the Royal United Services Institute* 64:453 (1919): 50 (hereafter cited as Weber, "Mobile Artillery"). [Back](#).

Note 11: Headlam, *History*, vol. II, 53. [Back](#).

Note 12: See P. A. Towle, "The Influence of the Russo-Japanese War on British Military and Naval Thought" (Ph. D. dissertation, University of London, 1973), and articles in the *Journal of the Royal Artillery* (henceforth *JRA*). [Back](#).

Note 13: R. G. Cherry, "Notes on the Battle of Liao-Yong August 25th-September 5th 1904," *JRA* 38 (1912): 502-508; Cherry, "Russo-Japanese War: The Employment of Field Artillery from June to October 1904," *JRA* 39 (1913): 152-60; Cherry, "Synopsis of the Battle of the Sha-Ho, October 1904," *JRA* 40 (1914): 385-400; Cherry, "Strategic Problems of Bohemia, 1866 and Manchuria, 1904 Compared," *JRA* 41 (1915): 362-72; M. Crofton, "A Day with a Japanese Field Battery," *JRA* 41 (1914): 611-16; G. B. Pollard, "Field Artillery in the Russo-Japanese War," (abridged and translated from the *Journal des Sciences Militaires*) *JRA* 41 (1914): 656-61. [Back](#).

Note 14: Shelford Bidwell and Dominick Graham, *Firepower: British Army Weapons and Theories of War 1904-1945* (London: Allen & Unwin, 1982), 27. [Back](#).

Note 15: *Field Service Regulations 1909* (London: HMSO, 1909), 135 (henceforth FSR 1909).

[Back.](#)

Note 16: H. A. Bethell, "Artillery in the attack and defence of positions," *JRA* 33:2 (1906): 61. [Back.](#)

Note 17: *FSR 1909*, 134. [Back.](#)

Note 18: Headlam, *History*, vol. II, 196. [Back.](#)

Note 19: *Ibid.*, 24. [Back.](#)

Note 20: *Field Artillery Training 1902* (Amended Edition 1904) (London: HMSO, 1904), 3-4. Hereafter, *FAT*, with year thus: *FAT 1904*. [Back.](#)

Note 21: Headlam, *History*, vol. II, 69. [Back.](#)

Note 22: Bidwell and Graham, *Firepower*, 42. [Back.](#)

Note 23: Headlam, *History*, vol. II, 133, 134. [Back.](#)

Note 24: *Ibid.*, 135. [Back.](#)

Note 25: *FAT 1912*, 9. [Back.](#)

Note 26: F. R. Bingham, "Practice Camps, 1912, and the lessons to be learned from them," *JRA* 39:11 (1913): 436; *Field Artillery Training (Provisional) 1912*, (London: HMSO, 1912), 19. Even brigades only worked together eighteen days per year (18). [Back.](#)

Note 27: See, for example W. H. F. Weber, "Some notes and suggestions on the control of Divisional Artillery in, or for, the battle," *JRA* 38:10 (1912): 417-35 and "A Divisional Artillery Staff in the Field," *JRA* 37:10 (1911): 409-19; C. Holmes Wilson, "Artillery 'Sous La Main,'" *United Services Magazine* 41:979 (new series) (1905): 329-32; C. E. D. Budworth, "Artillery in Co-operation with Infantry," *JRA* 37:1 (1910): 1-14. [Back.](#)

Note 28: H. A. Bethell, *Modern Artillery in the Field: A Description of the Artillery of the Field Army, and the Principles and Methods of its Employment* (London: Macmillan, 1911), 224-6. The CRA was allowed to command if the unexpected happened and fighting became static. Bethell's book was essentially a more readable version of *FAT*, also containing clear hints of what *FAT* "really meant" and written to appeal to a wider audience. [Back.](#)

Note 29: *FAT 1914* (London: HMSO, 1914), 240-44; Weber, "Notes and suggestions," 428. [Back.](#)

Note 30: Weber, "Notes and suggestions," 215. [Back.](#)

Note 31: Weber, "Divisional Artillery Staff," 413. [Back](#).

Note 32: H. G. Lloyd, "Methods of Controlling the fire of an Artillery Brigade," *JRA* 32:7 (1906): 313-4. [Back](#).

Note 33: Plate III in R. E. Priestley, *The Signal Service in the European War of 1914 to 1918 (France)* (Chatham: Royal Engineers Institution, 1921) shows just such an arrangement during the fighting on the Aisne. [Back](#).

Note 34: *Ibid.*, 499. [Back](#).

Note 35: S. C. M. Archibald Papers, Imperial War Museum (henceforth IWM), 61. It was not Archibald but his battery commander who liked small units. [Back](#).

Note 36: H. C. Williams-Wynn, "The Brigade System in the Royal Field Artillery," *JRA* 32:1 (1905): 17. [Back](#).

Note 37: Headlam, *History*, vol. II, 226. [Back](#).

Note 38: Budworth, "Co-operation with Infantry," 10. [Back](#).

Note 39: Headlam, *History*, vol. II, 168. [Back](#).

Note 40: J. F. Cadell, "The Organization of Field Artillery", *PRAI* 31:9 (1905): 348. [Back](#).

Note 41: *FAT 1914*, 260. [Back](#).

Note 42: Even this had exceptions, since *FAT 1912* and *FAT 1914* held that even 60 pounders—which lacked gun shields—could be used in direct fire. *FAT 1912*, 220; *FAT 1914*, 229. [Back](#).

Note 43: F. R. Bingham, "Lessons to be Learnt from the 1913 Practice Camps," *JRA* 50:11 (1914): 488. [Back](#).

Note 44: *FAT 1914*, 175; emphasis in original. [Back](#).

Note 45: Budworth, "Co-operation with Infantry," 2, 9; *FAT 1914*, 252, 259. Budworth later served as artillery commander for Rawlinson's Fourth Army from May 1916 until the Armistice. One point should be clarified: "moral" was generally pronounced in the French style and meant the same as the modern spelling of "morale." [Back](#).

Note 46: Headlam, *History*, vol. II, 156, 170. [Back](#).

Note 47: See *FSR 1909*, 105-6 and *FAT 1914*, 145-49 and 154-76. Bidwell and Graham in *Firepower* cover the infantry-centered nature of British tactics in Chapters 1 and 2. I believe they under-estimate the amount to which the artillery had a doctrine of absolute subordination

to the infantry's wishes. [Back](#).

Note 48: J. B. A. Bailey, *Field Artillery and Firepower* (Oxford: Military Press, 1989), 121. [Back](#).

Note 49: Bidwell and Graham, *Firepower*, 10. [Back](#).

Note 50: Bethell, *Modern Artillery*, 270. [Back](#).

Note 51: J. P. Du Cane, "Cover and Co-operation," *PRAI* 30:10 (1904): 361; C. E. Callwell, "The use of Heavy Guns in the field in Europe," *PRAI* 31:1(1904): 8. Both were brevet lieutenant colonels and future major-generals. [Back](#).

Note 52: *FAT 1914*, 232; emphasis in original. [Back](#).

Note 53: Bingham, "1913 Practice Camps," 499. [Back](#).

Note 54: Bethell, *Modern Artillery*, 138. He disagreed with the manuals and thought infantry could work up to 100 yards from the target with gunfire and 50 yards with howitzer fire (139). [Back](#).

Note 55: Much of this section was drawn straight from *FAT 1914* and Bethell. [Back](#).

Note 56: Bethell, *Modern Artillery*, 142-3. Bethell might have done well at Sedan with such tactics, but not in South Africa. Bethell had retired by 1914 but was "dug-out" and trained 25 Division's artillery until it went abroad in June 1916. [Back](#).

Note 57: *Ibid.*, 270. [Back](#).

Note 58: Bingham, "1913 Practice Camps," 488. [Back](#).

Note 59: *FAT 1914*, 296-7. [Back](#).

Note 60: *Ibid.*, 297. [Back](#).

Note 61: Bethell, *Modern Artillery*, 325. However, counter-battery work could still present a direct-fire problem. F. D. V. Wing, "The necessity for a High Explosive Shell for Field Artillery," *JRA* 33:6 (1907): 271-3. [Back](#).

Note 62: *Field Artillery Training 1906* (London: HMSO, 1906), 109, 141. [Back](#).

Note 63: Headlam, *History*, vol. II, 115. Adding phosphorous to produce a puff of smoke and make it easier to spot the exploding shells had been ruled illegal by unnamed higher authority for potentially violating international agreements on poisonous weapons. Naturally, once toxic gasses were used in the war qualms about a little bit of phosphorous vanished. [Back](#).

Note 64: Ibid., 113-4. [Back.](#)

Note 65: L. A. Hawes Papers, IWM, 22. [Back.](#)

Note 66: Bingham, "1913 Practice Camps," 495, 501. [Back.](#)

Note 67: *Garrison Artillery Training 1914* (London: HMSO, 1914) (hereafter GAT 1914) vol. II, 1; *Field Service Pocket Book 1916* (London: HMSO, 1916), 8-10, 39-40. [Back.](#)

Note 68: Headlam, *History*, vol. II, 227. [Back.](#)

Note 69: A. H. Webb, "Duties of a Heavy Artillery Brigade Commander in the Field," *JRA* 46:10 (1918): 447. Webb was one of the battery commanders. [Back.](#)

Note 70: Headlam, *History*, vol. II, 249. [Back.](#)

Note 71: Headlam, *History*, vol. II, 255. This was in 1906; shrapnel was being phased out of use by siege artillery by 1914. [Back.](#)

Note 72: H. C. C. D. Simpson, "The Future Role and Organisation of our Siege Artillery in War," *JRA* 32:9 (1906): 385-91. [Back.](#)

Note 73: *GAT 1914*, vol. II, 144. [Back.](#)

Note 74: A. F. Brooke, "The Evolution of Artillery in the Great War," *JRA* 51:5 (1925): 256-7. [Back.](#)

Note 75: Weber, "Notes and suggestions," 422. [Back.](#)

Note 76: Bethell, *Modern Artillery*, 343, 226. [Back.](#)

Note 77: Ibid., 343. [Back.](#)

Note 78: S. W. H. Rawlins, *A History of the Development of the British Artillery in France 1914-1918*, in Rawlins Papers, RAI MD 1162, 1 [Back.](#)

Note 79: It is entirely possible, but not clear from the records, that some officers were informally notified that on mobilization they would be AAs. [Back.](#)

Note 80: H. W. Wynter, "Higher Artillery Command in War," *JRA* 40:2 (1912): 57-68. [Back.](#)

Note 81: The requests are inferred; no messages have been found in the records, but the arrival of the 6-inch howitzers in France in the second week of September strongly suggests the BEF requested them, and it is clear that the request was made in the earliest days of the war. [Back.](#)

Note 82: Sir James Edmonds, compiler, *History of the Great War Based on Official*

Documents by Direction of the Historical Section of the Committee of Imperial Defence: Military Operations France and Belgium, 1914, vol. 1 (London: Macmillan 1922), 102, 106, 310, 318-9, 323. (Hereafter referred to as *OH*, with year and volume number, thus: *OH 1914*, vol. 1). [Back](#).

Note 83: *Ibid.*, 134, 186. [Back](#).

Note 84: Shelford Bidwell, *Gunners at War: A Tactical Study of the Royal Artillery in the Twentieth Century* (London: Arms and Armour Press, 1970), 17-19. [Back](#).

Note 85: S. C. M. Archibald papers, IWM. [Back](#).

Note 86: *OH 1914*, vol. 2, 134. [Back](#).

Note 87: Brooke, "Evolution," 261. [Back](#).

Note 88: 4th Division Operation Order No. 12, 18 December 1914, Field-Marshal Sir Archibald Montgomery-Massingberd Papers, Liddle Hart Centre for Military Archives, King's College London, (henceforth LHC), file 5/1. [Back](#).

Note 89: *OH 1914* vol. 1, 419. [Back](#).

Note 90: *Ibid.*, 451. [Back](#).

Note 91: *OH 1914*, vol. 2, 82. [Back](#).

Note 92: "Operations of the 1st Corps on the River Aisne, 13th September to 30th September 1914" (hereafter "Operations of the 1st Corps, Aisne"), Field-Marshal Baron Horne of Stirrke Papers, IWM. [Back](#).

Note 93: *OH 1914*, vol. 2, 336. [Back](#).

Note 94: *Ibid.*, 272. [Back](#).

Note 95: *Ibid.*, 249, 227. [Back](#).

Note 96: "Notes on Artillery in the Present War," 2 October 1914, G. Helps Papers, IWM. [Back](#).

Note 97: "3rd Army Corps Tactical Notes," c. September-October 1914, Montgomery-Massingberd Papers, file 5/1. [Back](#).

Note 98: *OH 1914*, vol. 2, 165, 274, 338, 408. [Back](#).

Note 99: Ibid., 206. [Back.](#)

Note 100: Ibid., 263. [Back.](#)

Note 101: "Further Notes on Artillery in the Present War," November 1914, Helps Papers, IWM. [Back.](#)

Note 102: Horne at one point acted as replacement for a CRA rather than as Artillery Adviser. "Operations of the 1st Corps, Aisne." [Back.](#)

Note 103: A. H. Hussey, *The War Diary of Brig. Gen. AH Hussey, RA, 1914-1918*, Royal Artillery Institution Military Document 1175, 18-19 December 1914. [Back.](#)

Note 104: OH 1915, vol. 1, 18. [Back.](#)

Note 105: See also Bidwell and Graham, *Firepower*, 100. [Back.](#)

Note 106: "3rd Corps Tactical Notes." [Back.](#)

3. Preparing the Attack: Part I, 1914-1916

1

Introduction

Artillery has two jobs in attacks: bombarding the enemy ahead of time, and then supporting the attackers during the assault with a protective barrage. Since the bombardment comes before the attack, it will be considered first.

Before the Boer War, a preliminary bombardment was a normal part of a battle plan. (In this study, to prevent confusion, the term "bombardment" will be used to describe artillery fire before an attack, and "barrage" for artillery fire during an attack.) Like so many other prewar conceptions, it was discarded during the war and replaced by the doctrine of artillery providing close support of the infantry. Bombardments had proven ineffective, while barrages worked. By 1914, the bombardment had made a partial comeback, but under the new thinking it would only be needed for sieges. There would be no bombardment in ordinary situations, and the target of any bombardment was the opposing troops, never fixed defenses. In the opening months of World War I, this more or less sufficed, since trenches were only scratches in the ground. The trenches were not yet serious obstacles, nor did they offer much protection to the German infantry. But by the spring of 1915, the Germans had built up their defenses: barbed wire, parapets, and other obstacles impeded movement and offered solid protection. At first the British saw the obstacles as the problem, and restored the preparatory bombardment. Their first efforts were rudimentary and mechanistic, but over time the BEF learned what to do; new weapons and new methods also helped. Eventually German defenses would be shelled as much as necessary, pressing ahead against weak defenses but pulverizing strong sectors in order to save lives in the eventual attack.

The *Field Service Regulations*, the army's war-fighting guide, foresaw battles falling into the categories of either mobile operations or siege warfare, with minimal overlap. Douglas Haig supervised the writing of *FSR*, and it set the main goal of artillery as support of the infantry assault. This fit the army's general view of battle as a struggle of will and morale. The infantry would gradually advance to charging distance, while the artillery would "help the infantry to maintain its mobility and offensive power." ¹ Then the artillery fired an intense burst, the infantry charged, and routed the enemy. There were provisions for defenders in various types of cover. Howitzers, with their arced trajectory, could fire into trenches. Percussion shrapnel would be used against buildings, since the slight delay of the fuze meant the shells would burst inside. ² However, the section on mobile warfare simply ignored the issue of obstacles. Barbed wire, although used in both South Africa and Manchuria, was not mentioned at all.

Sieges were considered an altogether different kind of operation, mutually exclusive from field battles. Even in sieges, however, bombardments were discouraged, and it was thought that they "should rarely directly precede the ... assault," thus sacrificing many of the bombardment's effects, perhaps in an effort to preserve surprise for the moment of assault. ³ Sieges were viewed as an attritional type of battle, and inflicting losses was the field

artillery's main employment, although there might be circumstances for them to reduce "the resisting power of fortified localities." ⁴ Cupolas, parapets, and trenches were the expected obstacles; once again, barbed wire was ignored. The main emphasis placed on diminishing enemy morale was sound: if the enemy was disinclined to fight, strong positions were useless. However, the focus on morale was excessive. If other factors are roughly equal, then morale can be the difference, but the serious imbalance between offensive and defensive firepower was being ignored.

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More time had been spent thinking about field battles than sieges, but the real failing was not in doing either one badly, but in separating the two. Encounter battles were expected, sieges were possible; what the British army was not ready for was set-piece attacks. British plans for attacks revolved around scenarios involving open flanks, not the need to penetrate a defensive line. The British army had no ready response to the circumstances they would be facing.

Preliminary bombardments were, in a sense, politicized. They were correctly seen as a vital part of preparing an offensive, but the bombardment was designed according to the strategic goals of the offensive, rather than the offensive's goals being tailored to fit the resources and tactics available. Planning was top-down. Since the Allies intended to win the war quickly, and were usually sure that German morale was failing, the Allies usually tried to break through, to crack the German lines and pass the cavalry through for a grand pursuit. The flaw in this approach was that it put the cart before the horse. While the strategic goals were impeccable, the tactical means were lacking—planning for pursuit and exploitation was useless when the Allies could not even break the German line. Bombardments were sometimes shortened to save shells for later (after the theoretical breakthrough), or to try for the element of surprise.

To digress for a moment, there is no right answer to the question of what strategy the Allies should have used on the Western Front. In the broadest terms, they had a choice between a breakthrough strategy—to try and win the war quickly, and thus at less overall cost, although probably at a higher short-term cost—or an attritional strategy that accepted a longer war but tried to compensate by losing fewer men per month. The politicians wanted the war over quickly but also wanted low casualties. Generals also had a responsibility to their troops to not waste lives in futile attacks. On top of these pressures, there were the normal ones that occur in any organization: hesitant leaders are generally replaced by someone who is more positive about their goals. This combination of pressures produced senior commanders who were, generally speaking, prone to attack and try for breakthroughs. It also brought political pressure, however indirectly, to bear on major offensives, but not on smaller attacks. The converse was tried on occasion: launching tactically efficient attacks and trying to combine them to strategic effect. It could work (as at Gorlice-Tarnow), it could fail and turn into an attritional bloodbath (as at Verdun), or (as in the German 1918 offensives) it could fail when the tactical and strategic goals diverged. Thus there is no one best strategy to use in a war, even using hindsight.

Since bombardments had become so important, the artillery moved to center stage. Being so noticeable and important meant that the artillery (and artillerymen) frequently got blamed for things that went wrong. Failed battles stuck in the mind, and because the bombardment generally was the starting point for failure, the blame fell on the artillery. In fact, the artillery designed neither the offensives nor the tactics. Nor, in 1915, did artillerymen know enough to criticize the plans handed to them. They made suggestions but were constrained by their belief that artillery should be subordinate to the combat arms. However, the Royal Artillery did what it could to help, and artillerymen (once they had the necessary experience) were not shy about suggesting alternatives.

1914

Reflecting expectations of a low firepower/high mobility war, in 1914 the BEF went to France without any siege artillery. At first their tactics did not include bombardments, but within a month it was evident that more firepower was needed. The Siege Train (referred to in capitals) and various other "heavies" trickled out to France, even without a siege going on. They were very effective against the slight German trenches, although once the Allies lost the initiative it became more difficult to integrate them into the fighting. The shell shortage also affected them, reducing the firepower they could produce. By December, The Siege Train was a defunct concept, and the Committee on Siege Artillery Material, only three months old, was dissolved. ⁵ It had done its job of diligently calculating the number of guns needed to break the German frontier forts, but its results were fantasy, given both the military situation and the pace of munitions production. Perhaps its most original conclusion was the need for a major-general to command The Siege Train, thus guaranteeing a high-ranking position for an engineer.

Instead of a separate Siege Train, siege pieces went to France as fast as batteries mobilized; in peacetime, siege batteries were kept at reduced strength in personnel and lacked any horses. Siege artillery proved its worth, although first impressions were prejudiced by pre-war views. At first, Haig found he could have all the 6-inch howitzers to himself, because no other commander wanted them, believing they would be too slow for forthcoming battles. ⁶ From September through November, Sir John French tried to pry heavy guns out of the War Office, even begging for old muzzle-loaders. From being viewed as an encumbrance, heavy guns were suddenly vital: "If heavy ordnance is not forthcoming when required future operations may be seriously handicapped and protracted, and increased loss of life may result." ⁷

Tactically, the heavy artillery was used properly: the heavies aimed at strongpoints, fortified buildings, and trenches. This shelling of positions was combined in a complementary fashion with field artillery and small-arms fire intended to kill and demoralize the defenders. Artillery "preparation" at the time was quite simple. A bombardment consisted of a few minutes of shelling before the infantry cheered and charged. German positions were not elaborate enough to require a more complicated artillery plan, nor were there enough shells to do much more when the need arose. Already, the requirement to attack on time or according

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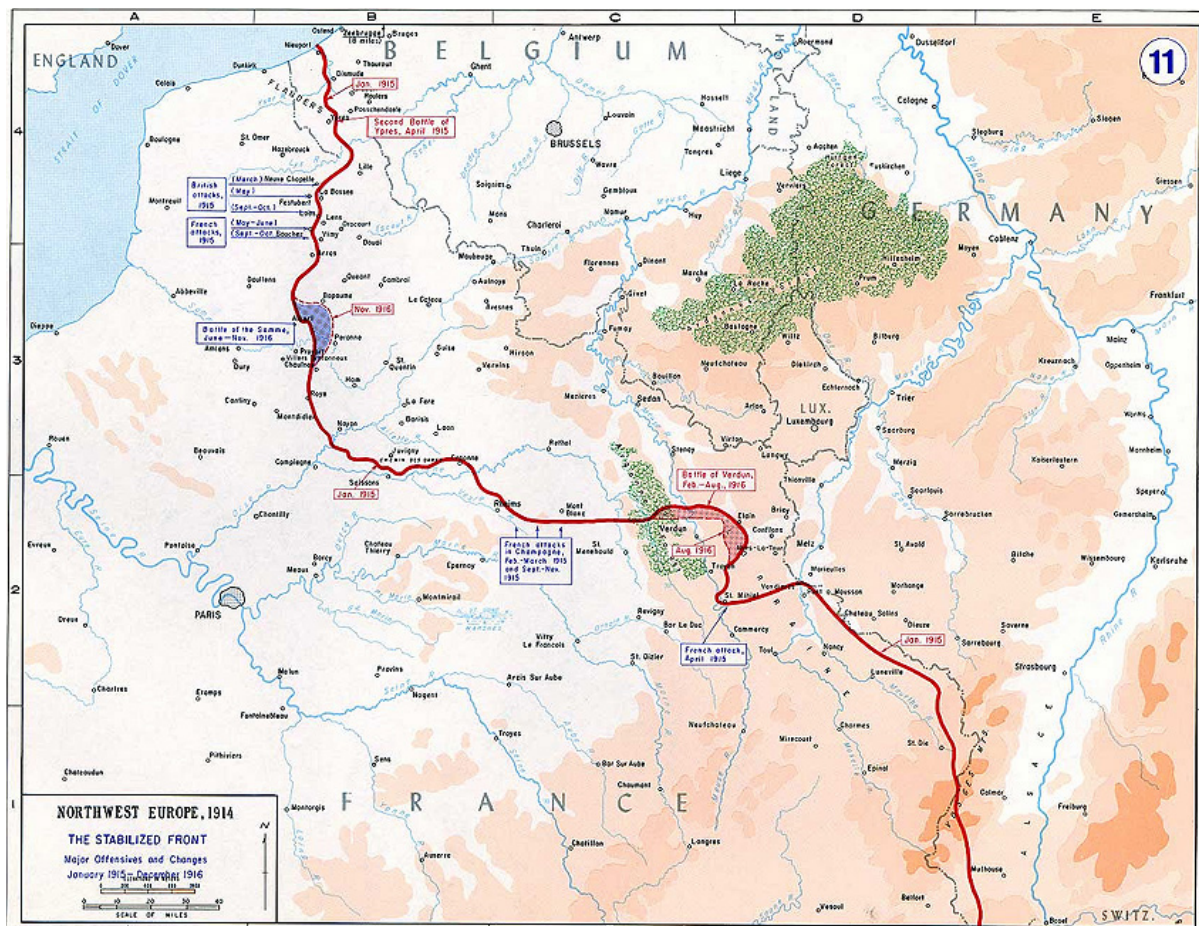
to a schedule trumped the need for a heavy bombardment. If there was not enough heavy artillery, field artillery was asked to do what it could. Sometimes the lack of a bombardment was entirely justified. For a quick counterattack, so common in the desperate fighting around Ypres, it was more important to counterattack before the Germans consolidated a gain than to deluge a position with shells. Once the German pressure abated, the BEF could recover and contemplate how they should conduct their own war-winning offensive.

The First Trench-warfare Attack

The BEF's first planned set-piece attack was in December 1914, up the Messines Ridge. While pathetically unsuccessful, it represented the state of the art, which still included no wire-cutting and no preliminary bombardment. ⁸ The senior artilleryman involved thought that any preliminary bombardment would sacrifice surprise, not differentiating between five minutes or five days, but he was overruled. ⁹ (His view closely followed what Bethell had written: "A preliminary bombardment of the point of assault would only serve to attract attention to it." ¹⁰) Sir John French limited himself to saying that the heavy artillery should "support the general attack," and afterwards noted that the attack was "assisted by a heavy artillery bombardment." ¹¹ Clearly, French had no particular idea of what the artillery should do, only that it should be involved. The tone of the whole operation was hurried and amateurish; only the infantry plans were even half-heartedly thought out, and the artillery and cavalry were both simply supposed to "support" the attack. ¹²

The lack of artillery wire-cutting stemmed from three causes. First was the shell shortage: there were not enough shells to cut the German wire, and the British troops had to resort to bizarre expedients such as carrying rope mattresses to throw over the wire so they could run across. Secondly, there was very little experience in using artillery to cut barbed wire, and no established method of doing so. Finally, trench destruction was considered more important; the focus was on the German troops, following the pre-war siege doctrine. The need to attack was paramount, and with a limited number of shells trench destruction took priority over something that could be extemporized. Smith-Dorrien, in letters of that week, referred to "completely smashing to pieces the enemy's trenches" and "blowing in any trench the enemy can make," and these were things that could not be jury-rigged with rope mattresses. ¹³ Haig, a few days later, thought that a bombardment was necessary "to destroy the enemy's protection." ¹⁴ There was no planned support during the attack, although the guns would be available to fire on opportunity targets if orders could reach them about where fire was needed.

Obviously, smashing German trenches would kill Germans, destroy machine-guns, and demoralize the defenders, but Smith-Dorrien's ideas go back to the old division between mobile and siege warfare. He saw trench warfare as a temporary circumstance, soon to be corrected. After the breakthrough, flanks would reappear and "normal" fighting would return. ¹⁵ While Smith-Dorrien was referring to an attack in December 1914, this view of trenches and barbed wire as a momentary problem rather than as the new norm would prevail through 1915. It was a slight update of the pre-war ideas about morale: if these obstacles could only be removed, the two infantries could again fairly test their mettle.



Map 12. Western Front 1915-1916. This map shows the sites of the main battles of 1915 on the Western Front.

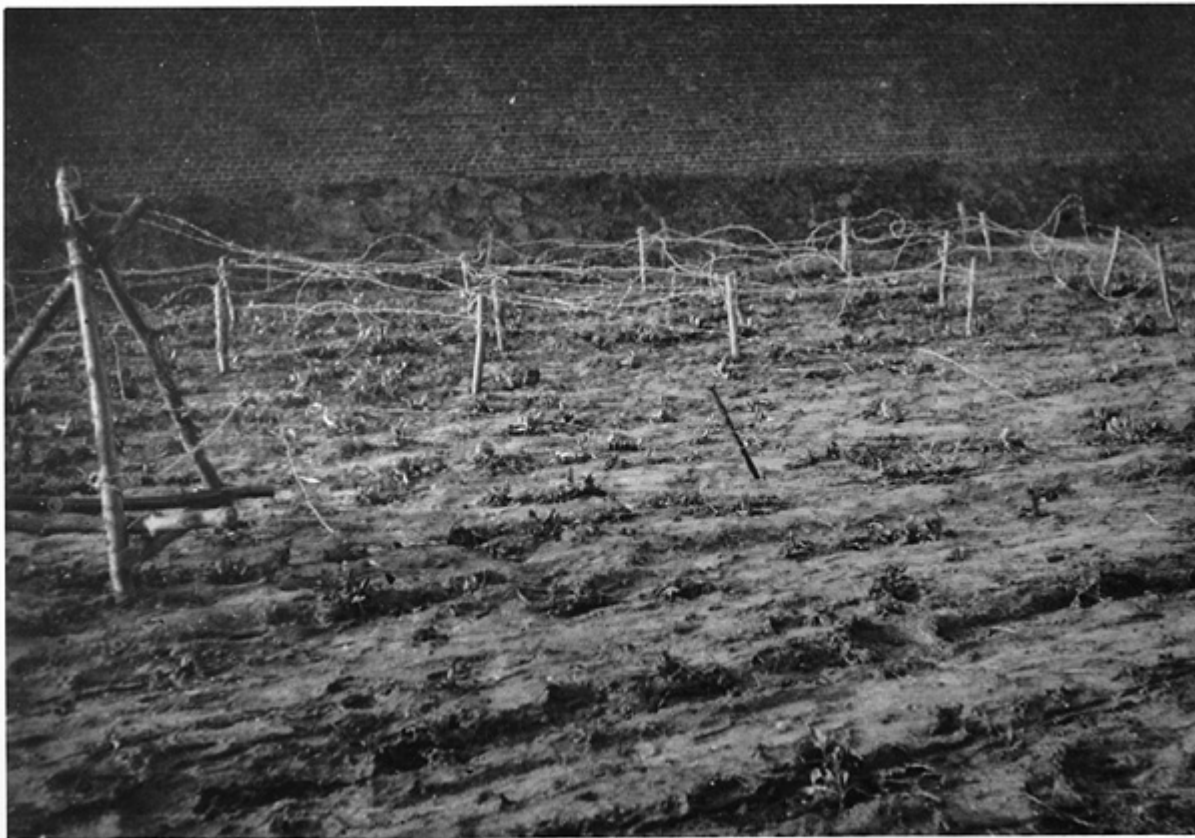
Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

1915: Neuve Chapelle

The second British trench-warfare attack was at Neuve Chapelle. (Map 12 shows the battles of 1915 and 1916.) The BEF was attacking to prove to the French that the British forces would (and could) attack; the primary goal of the attack was to be aggressive and win some political points with the French. Militarily, the objective was to break the German line and occupy a low ridge that gave the Germans observation over British lines and would give the British observation over German lines. The battle lasted from 10-12 March 1915, and the pause between attacks on entrenched positions from December 1914 to March 1915 gave the British much more time for planning. Wire-cutting was a key part of this planning process.

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With the background of the Messines Ridge attack, in January 1915 the British conducted experiments on the wire-cutting abilities of machine-guns and field guns. Replicas of German positions were built and shelled under realistic, if optimistic, conditions. In light of later historical controversy, shrapnel performed better than HE in these tests. ¹⁶ The French had already experimented in mid-December 1914, and the BEF had copies of the reports in a week, but the French results were not directly applicable, mainly because the French were using HE, which was in short supply for the BEF. ¹⁷ Between those tests and Neuve Chapelle, front-line experience in minor actions was carefully noted and circulated, in hopes of learning from these experiences. ¹⁸ Haig personally pored over these reports in planning the battle of Neuve Chapelle.



Barbed wire before testing, Armentieres, 30 December 1914. While there is no other evidence of this particular wire-cutting test, these before-and-after photos show how little effect machine-gun fire had on barbed wire. They also show how slight a typical barbed wire entanglement was in the winter of 1914-15, and how thorough the BEF was in rigorously testing what was needed to solve the problems of barbed wire.

Source: IWM photo Q51564.



Barbed wire after testing, Armentieres, 30 December 1914. While there is no other evidence of this particular wire-cutting test, these before-and-after photos show how little effect machine-gun fire had on barbed wire. They also show how slight a typical barbed wire entanglement was in the winter of 1914-15, and how thorough the BEF was in rigorously testing what was needed to solve the problems of barbed wire.

Source: IWM photo Q51565.

I received a detailed report of the Artillery work in the action against Duck's Bill (Givenchy) last Saturday (20th). [Examines the wire-cutting in terms of number of guns, range, number of shells, duration of fire, length of wire, layout of wire, and effectiveness overall.] The effect was very successful. The 'storming party' report that they had no difficulty in getting through the wire. ... The storming party report enemy's trenches very much knocked about. ¹⁹

But wire-cutting was only one of the challenges to be overcome; there had been no comparable bombardment tests. ²⁰ Different people had different ideas on how many shells were needed to demolish German trenches, and artillerymen had no better ideas than anyone else. It might take minutes, hours, or days, depending on who was asked. ²¹ ([Appendix 5](#) has Sir William Robertson's general thoughts.) Since nobody had data or experience, Haig felt free to consult widely, even outside the chain of command. But time passed and he needed to

have a plan; in the end he demanded, and received, one. 22

... I received this evening Rawlinson's proposals for the forthcoming operation. I wired for him and General Holland (commanding the artillery of the 8th Division). They arrived about 9 p.m. It is difficult to estimate the proper number of howitzers to batter in a line of trench. We don't want to run any risk of failure, so I decide to ask for two more batteries of 6-inch howitzers (siege) making 28 in all. None of the artillery commanders seem able to agree as to the amounts of ammunition or time required to destroy a given length of hostile position as now constructed. So I decide to go in to G.H.Q. tomorrow to see C.G.S. on the subject. 23

There was not too much logic behind this plan. Without any data to plan the bombardment, the bombardment was simply assigned as much time as the wire-cutting would take.

(Appendix 6 has some of Rawlinson's handwritten planning notes.) The goals for both elements were the same: complete results, sweeping away all the wire and demolishing all the trenches. Moreover, had more heavy artillery and especially more shells been available, the plans would likely have been changed to a longer bombardment, with the wire-cutting added at the end.

Prior and Wilson have neatly covered the course of the battle, so only a very brief summary is needed here. The bombardment stunned the Germans, except on the British left, and the initial attack was largely successful. But bad communications delayed the advance of reserves, and the Germans occupied a second line that the British could not break. The initial success blinded the officers involved to the flaws in the attack's plan, but convinced them that when the communications problems were ironed out, there could indeed be breakthroughs in trench warfare. It is vital to keep in mind that the bombardment had been intended to destroy the German positions and troops; it only turned into a neutralizing bombardment because of the lack of guns and shells. 20

The partial victory at Neuve Chapelle was a combination of skill, judgment, and beginner's luck, but unfortunately the bombardment plans were taken as a template that needed only to be repeated for guaranteed future success. The reason for the short bombardment (the tie to the wire-cutting) was forgotten. Nor were wire-cutting and bombardment accorded equal analysis. The wire-cutting had mainly worked, but the bombardment had suffered problems, so the BEF focused on fixing the bombardment. This likely contributed to forgetting the linkage between the two. In post-battle analysis, the failure on the left flank (where British guns had missed the German trenches and thus failed to suppress the German infantry) could be explained by bad luck and inaccurate shooting, thus further masking the fundamental issue of shortage of guns and shells. The British command had a static view, and they passed on the "lessons," assuming these would hold good for the rest of the war. (To be fair, they expected to win the war later in 1915.) Oddly, in doing this senior British commanders compromised their belief in personality-dominated warfare. This template assumed that the enemy would not react to British success, ignoring the human element. Both First Army and GHQ circulated reports of lessons learned, so the success might be repeated in the future. 24 Not content with this level of success, after-action reports were studied and fresh wire-cutting experiments were conducted a week later. 25



German machine-gun position, trenches at Neuve Chapelle, 10 March 1915. According to the original caption, this machine-gun inflicted heavy losses on the 2/Scottish Rifles, an action described in John Baynes' book *Morale: A Study of Men and Courage*. The gun was set clearly into the parapet, and its position might have been visible before the attack; its smoke and flash would have been clearly visible during the attack, even if it had been set up for flanking fire. The effects of a howitzer shell on the machine-gun are clear, and the original caption says that the direct hit occurred only in the second bombardment, after the original attack had been stopped.

Source: IWM photo Q49208.

Another View on Tactics

The senior artillery officer in the BEF, Major-General John du Cane, drew different lessons from Neuve Chapelle. He advocated limiting the infantry attack to the area the artillery had smashed, a procedure later called bite-and-hold, one that had been raised at the same time by Sir Henry Rawlinson, who had commanded the main attack at Neuve Chapelle. ²⁶ Essentially, du Cane suggested that the war was not going to be won quickly, so it should be won efficiently, and looked more toward mechanistic warfare than to leadership and morale. He was arguing for attrition, not breakthroughs. His ideas were not adopted, nor was there a strong debate or even a reply to his memorandum. In an organization as ponderous and slow to change as an army, a complete change based on a single datum was unlikely, especially since Neuve Chapelle had been a partial success. The 'old guard' could point to this and argue for improvements: surely it was better to iron out the flaws in the present system than to junk everything in favor of a totally new and untested scheme. It is also a mistake to think of this debate as embodying two diametrically opposed schools of thought. Officers were enormously busy with myriad other problems, and many simply never thought this question through. It is easier in retrospect to measure people against a standard and categorize them according to a dichotomy; more typically they agreed with bits of both. (For instance, Smith-Dorrien had thought about artillery bludgeoning the Germans out of successive trench lines and thereby creating a breakthrough.) ²⁷

Not all those who rejected the bite-and-hold approach were reactionary: as a strategy it had flaws. First, there were political and diplomatic problems. It would be hard to get political and popular support for any plan that did not call for quick and decisive victory. At this stage of the war, the massive volunteer forces enlisted in 1914 had not entered combat, and Britain was hardly likely to give up on decisive battles before fielding her full strength. It would also be very hard to get the French to agree that the Germans should occupy portions of France for the foreseeable future. It also required that the politicians totally trust the military's views on strategy. Suspicion and frustration had not yet accumulated to the extent they would reach in 1916 and 1917, but even in 1915 some politicians doubted the Western Front strategy. Many politicians favored the Gallipoli venture, and the military 'experts' were not always right. After the failed breakthroughs of 1916 and 1917, in late 1918 the Allied generals were still wondering whether they would win the war in 1919 or 1920. Second, there was confusion about what constituted a 'bite' as opposed to a breakthrough. Henry Rawlinson, something of a 'biter,' wanted to take the village of Neuve Chapelle in two bites (of roughly 300 yards each), but when planning the Somme offensive he argued 2,000 yards was a bite. ²⁸ To be fair, the circumstances were different (and would be for every battle), but at both Neuve Chapelle and the Somme Haig and Rawlinson disagreed. Each was right once, but the bite-and-hold school was not infallible. Third, switching to bite-and-hold meant rejecting the army's whole concept of warfare, making a leap in the dark away from all accepted ideas and experience. However, the concept would survive as an alternate strategy, and was resurrected at least as an internal memorandum in GHQ before the Third Ypres campaign. (See Appendix 22 for details.)

While an artilleryman, du Cane, put these ideas on paper, it would be a great mistake to think that this argument pitted the artillery versus the rest of the army. Artillery officers did not flock to du Cane's corner, and many later criticized the concept he advanced when they rose to influential positions. Henry Rawlinson may have invented the phrase 'bite-and-hold,' but even he treated it simply as an option, not as a radical new strategy that would replace everything before it.

The Next Attacks: Aubers Ridge and Festubert

The next British attacks were timed to help much larger (and geographically separated) French offensives. On 9 May the battle of Aubers Ridge was fought for nearly the same purpose as that at Neuve Chapelle: to capture a piece of high ground that offered an observation point. On 20 May the BEF scraped up enough troops, despite the ongoing fighting at Ypres, to launch a larger and longer-lasting attack at Festubert.

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For the attack at Aubers Ridge, the First Army relied on repeating the artillery procedures of Neuve Chapelle. Simply repeating the pattern of Neuve Chapelle was a grievous error. The Germans took the simple step of reinforcing their trenches and stringing more barbed wire. One element of the bombardment had been thoroughly tested—using 18-pounder HE shells against trenches and parapets as well as the larger, more powerful shells from howitzers. Previously, only howitzer HE had been trusted against these sturdy targets, but on 20 April careful tests had apparently proved field gun HE adequate. Haig hoped this would mean larger attacks, since 18-pounders could now supplement the limited number of howitzers. ²⁹ At Neuve Chapelle, the frontage of the attack had been limited because the number of howitzers was limited; the BEF had no data proving howitzers were the only weapons capable of the job, but it had been cautious. Now Haig thought he had a way to bypass these limitations and launch larger, and thus more powerful, attacks. Yet the 20 April tests were conducted against parapets like those at Neuve Chapelle, as if the Germans would not react to that battle.

At Aubers Ridge, after an inadequate preliminary bombardment, the morning attack lost heavily for no gains. But the attack was renewed in the afternoon after a bit more wire-cutting and a cookie-cutter repetition of the morning's inadequate bombardment. (Given the lack of time to plan anything else, repeating the original plan, however flawed, may have been the only option.) The afternoon attack also failed, again with heavy losses. Haig, ever optimistic, and operating with inadequate information, was planning how to resume the attack the next day until more detailed information reached him and the attack was abandoned. There was a curious dichotomy in the later plans. Some further attacks were planned, both in new areas and renewing earlier, failed, attacks. When renewing an attack, there was to be a further bombardment, presumably because the element surprise was gone. But when launching a brand new attack (even only a few hundred yards away), no destructive bombardment was planned, only a few minutes of fire to suppress the German defenders. Why these brief bombardments were thought to be enough when similar bombardments on 9 May had failed was never explained, but it is clear that officers thought in terms of two different types of attack; again the BEF suffered from compartmentalized

thinking. GHQ referred to "rapid assault" and "deliberate methods," and preferred the latter. ³⁰ GHQ finally stopped the attacks, uncharacteristically insistent on the point, emphasizing that

It is of great importance that the infantry should not attack until the artillery preparation has been effective. The results of your attacks on the 9th show that the artillery preparation was not effective, and the Commander in Chief does not feel sure that sufficient time is being allowed on this occasion. ³¹

Haig could see that the criticism was justified, and he now focused on accurate bombardments, complaining that Germans could survive even very heavy shelling. ³² He *"had no intention of ordering any infantry under [his] command to attack until the hostile position was thoroughly prepared,* so they [Gough and Birch] were not to underestimate merely to please G.H.Q." ³³ Haig's error had been in using 18-pounder HE to try to replace heavy howitzers. Eager for a larger attack that could be the decisive one, he needed more bombardment guns, but the 18-pounder shell was just not powerful enough. He would continue his optimism about 18-pounder HE, but would never again base a whole battle upon it. ³⁴ Artillery officers had been more dubious of its performance before the battle, but had loyally accepted the decision of higher authority. Noel "Curly" Birch, Gough's artillery adviser who Haig would later promote to GHQ, then drew up plans that would meet Haig's own standard of "thorough preparation," but Haig altered the plans and suddenly there was a miraculous coincidence between what he had available and what he needed. Birch knew better but did not complain; he can be faulted for being too loyal, but he was steadfast in subordinating the artillery to the other arms. ³⁵

After the failure at Aubers Ridge, the method of bombardment was altered, yet the purpose—
destruction—was not. One factor in this change was the shell shortage, which led GHQ to drop intense bombardments, which it felt led to "hurry and inaccuracy and consequent waste of ammunition. ... We must base our plans on careful, methodical and accurate fire, aimed at producing the desired result with the minimum of ammunition." ³⁶ That this apparent sea change in the nature of bombardments was made so quickly (two days after Aubers Ridge) and without debate shows that the short bombardment à la Neuve Chapelle was the aberration rather than the rule, and that the purpose of bombardment was unchanged. The short, or 'hurricane,' bombardment had worked at Neuve Chapelle because the German defenses were weak and the defenders were stunned by even the few available shells. The next efforts at such bombardments failed because the Germans thickened their defenses, which both saved their lives and gave the survivors more confidence to fight once the shelling lifted. The new German defenses were too stout for the limited number of shells that could be fired by the limited number of British guns in a short period of time. Since the BEF did not have any more guns with which to fire more shells in a given span of time (the 18-pounders' HE having proved useless), the answer was to change the time factor in the equation. The slower bombardment also promoted accuracy and made destruction easier to achieve, but at the expense of abandoning operational surprise.

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The 'hurricane' bombardment was designed for purposes of destruction, not neutralization, as it would be later in the war and after the war. The pre-war objective had been neutralization, and that had worked through the field battles of 1914, but for the set-piece trench warfare attacks the British army sought destruction. Neutralization was a lucky and unintentional by-product at Neuve Chapelle. When attempts at both destruction and neutralization failed, the natural response was to use more guns and shells. Destruction continued to be the goal until the Royal Artillery more than mastered the techniques. Not until November 1917 would destruction be abandoned as a primary goal of artillery attack, but until the definite development of the creeping barrage the artillery's first priority was destroying German positions and obstacles.

So the BEF continued to plan artillery bombardments to destroy the enemy. The Chief of Staff, Sir William Robertson, had already written Haig recommending "deliberate, observed, and controlled fire, so that every shot may be definitely directed on the objectionable places," and that is what was done. ³⁷ In the next battle, at Festubert, just a little further along the Aubers Ridge, there was a 60-hour preliminary bombardment designed to demolish German defenses; demoralized defenders would simply be the by-product. Again the battle was to support a French offensive, even though the BEF was desperately short of ammunition and shells. The ammunition situation in the BEF was so bad that infantry reinforcements were held in Britain because there was not enough ammunition for them to use as combat troops if they went to France. ³⁸ By all objective criteria the attack failed, taking some first line trenches and a short stretch of one reserve trench in exchange for 16,000 casualties. GHQ repeated its criticism, ³⁹ but the battle dragged on for a fortnight of small attacks and growing casualty lists. Only days after Festubert staggered to an end, planning for a minor attack near Givenchy began, calling for a "deliberate bombardment of the most accurate nature ... extending over several days, to ensure ... obstacles are destroyed and that [German] troops are seriously demoralized." ⁴⁰ The First Army submitted ammunition estimates it blandly admitted were unreliable, even if they were based on experience. These estimates fluctuated depending on what was likely to be available, since—despite all official pronouncements about properly preparing attacks—the BEF felt strong pressure from the French to attack, and many British generals were willing to do so. It was more important to attack than for the attacks actually to be properly prepared. ⁴¹ Gains were minimal, and afterwards GHQ noted, "Ammunition is the governing factor in the operations and it must be recognized as such." ⁴² Given the BEF's track record in 1915, the truth of such a statement was not likely to interfere with operations.

Loos

The next significant British attack was the battle of Loos, in late September 1915. (The Panoramic Photo shows part of the Loos/Lens sector, although of uncertain date.) Once again the BEF was cooperating with a major French offensive. Following the new pattern, the bombardment lasted for four days so that all fire could be carefully aimed and no shell would be wasted. Emphasizing the continuity in artillery thinking in 1915, when the First Army issued a circular entitled "General Principles for the Attack" in September, it was little more than a re-print of April's edition. ⁴³ (The April edition is available as Appendix 7.) Once more, there were not enough heavy howitzers, and 18-pounders firing HE were pressed into

service, but the number of bombardment guns (and their power) was still markedly insufficient. The largest British attack to date, it was supported by the largest number of guns. But the density of the artillery support was actually diminished, as the guns were spread over a wider front. Moreover, the greater number of guns led to new problems posed by the inadequate command structure. Guns were parceled out to the infantry divisions so that the divisions could control all aspects of their attack. While it did ensure that a division commander had complete responsibility, it meant the infantry formulated requirements without considering artillery problems or asking for suggestions, and then complained if anything less than perfection was the result. Holding firm to their ideal of providing whatever support they were asked for, artillery officers did not complain until after the battle, when the defective system was changed.



Balloon view of the bombardment of Roclincourt, 23 September 1915. This photo shows how sparse a bombardment could be—especially in 1915, with the shell shortage looming over all plans—and how important aerial observation was. In terrain this flat, ground-level observation was nearly useless, and a house or tree used as an observation post would soon have been bombed.

Source: IWM photo Q42236.

With few guns to cover a large front, the shells were spread thin: there were only two 4.5-inch shells and one heavy howitzer shell available per yard of German trench, and that assumes that they hit their targets. ⁴⁴ The weight of shelling was inadequate (less than was fired against weaker defenses at Neuve Chapelle), and the Germans had once again improved their defenses. At Aubers Ridge and Festubert the Germans had strengthened their front line trenches, and now they added a series of strong supporting lines. ⁴⁵ The BEF tried to plan around this, recognizing that it lacked the means to do everything it wanted, but not all plans were reconciled. Haig thought it was only necessary "to destroy the hostile front trenches or parapets where they form a physical obstacle to the infantry advance," but he also wanted German observations posts, command posts, communications trenches, and roads shelled. ⁴⁶ All this was necessary but impossible given the shortages. Haig also reduced his requirements to fit within his means—as part of the Allied effort, the BEF was going to attack whether it was ready or not. The artillery plan was reduced to hitting key points, firing as much as possible on other targets, and hoping for the best.

So, without enough shells to destroy the Germans, the First Army attacked on 25 September covered by smoke and gas. All through the planning of the attack, the First Army knew there would not be enough guns for an adequate destructive bombardment. The use of lethal gas (chlorine) was intended to compensate by killing, terrorizing, or incapacitating the German troops. In one sense this was a reasonable substitution for artillery: gas could kill as well as HE could. But gas did not breach obstacles or rip telephone cables or demolish observation posts. In addition, there was not enough gas to saturate the German positions. German gasmasks gave about forty minutes of protection, so the gas had to provide a lethal concentration for over forty minutes. So the British mixed smoke into the gas discharge to mimic gas so the Germans would at least keep their gas masks on longer, even though the gas would kill very few men (some masks would fail, and some dugouts would collect a lethal concentration, even if the general average was too low). In this case, however, the gas/smoke cloud was intended mainly for cover, reducing visibility so the Germans could not see the attackers as clearly. From playing a destructive role in the plan, the gas had switched to only a suppressive role, and in only a very limited way. All these compromises were necessary because the BEF had promised the French to attack on a specific date.

The gas, smoke, and the lifting barrage indicated the recognition that the Germans would not be destroyed (a belated recognition of artillery's limitations). The whole artillery plan was a muddle, based more on the necessity of attacking than on the presence of sufficient guns and shells or clear thinking. Haig himself spent more time considering how the gas and smoke should be used than on going into details concerning the artillery; perhaps he felt he knew enough about artillery planning, or maybe he was more interested in the novelty of gas as a weapon. ⁴⁷ He did intervene in the planning, for instance urging the use of 18-pounder HE, which some subordinates recognized as inadequate to the demands put on it. ⁴⁸

The bombardment had not "*thoroughly prepared*" the German positions, as Haig had himself promised in June. The battle's results were mixed, but there was great dissatisfaction with the artillery's performance. Several problems were identified, including poor organization but

also lack of guns and shells, inaccuracy, and poor quality of materiel. Haig blamed organizational problems and shortages, and was confident gas and smoke were adequate substitutes in the destructive role until more artillery was available, not noticing the different functions the two weapons played. ⁴⁹

The Search for a Formula

Throughout 1915 there was a tendency in the BEF to look for an artillery formula, a magic solution (expressed as guns or shells per yard) that would end trench warfare. Careful tests determined the wire-cutting ability of field guns, but nothing could show how to demolish German trenches, since the Allies could never test a position until they had captured it. Nor was there a way to predict the effects of shelling on enemy morale. This led to debate about whether short, intense bombardment or prolonged shelling was more debilitating, a question without an answer. The artillery formulae created in 1915 varied, depending on when they were made (battle experiences changed expectations), who was making the forecast, and (since German defenses varied) the sector of the front. The shared trait of the formulae and forecasts was that none were implemented. ⁵⁰ Despite paying extensive lip service to the primacy of artillery in the new conditions of trench warfare, British attacks regularly, even typically, took place without adequate artillery preparation. Trained since Sandhurst and Woolwich to consider offense more important than defense, generals simply attacked with what they could assemble. For one minor attack Birch, Haig's trusted artillery adviser, established his requirements for artillery support but then had to revise them downwards twice until they approximated what was available. ⁵¹ Rawlinson, who was to command the attack in question, heard from Haig that

GHQ say, if we [First Army] can't do the job with less shells they will transfer the active duties to the II Army who can do it with a less expenditure. I [Haig] am quite sure they cannot but it is a bad policy to start the competition between the two Armies cutting us down in ammunition like this only increases the number of casualties and seriously endangers the success of the enterprise. It is a great mistake for which Sir John is alone responsible. ⁵²

Yet the next day Rawlinson forgot his concerns, and remarked he had "a lot of howitzers" and later thought the attack was bound to succeed since it followed two days of bombardment. ⁵³

The formulae were also misused: too often in 1915 the BEF assumed that repeating a successful formula would bring success. For a start, the Germans could change their defenses, as they did at Aubers Ridge and again at Loos. Thus any artillery formula was instantly out of date the moment it was used. Second, artillery may not have been the key feature in a successful attack. Finally, this emphasis was also a curious philosophical departure for the British army. Firmly believing that warfare was morale-centered and depended on the quality of men and officers rather than on bookish knowledge, why were they now desperately looking for quantitative formulae? Perhaps in a way it was so they could return to the task of leadership. If a formula were discovered, they need never worry about artillery again—artillery would be factored out of their discussions, and

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leadership/morale restored to their rightful place. What was more, the successful formula would have by definition ended trench warfare, and the fighting would have returned to a 'normal' state. It is harder to say why British generals ignored the Germans' ability to improve their defenses or tactics, something the British did recognize later in the war. Probably the hope that trench warfare was a temporary aberration discouraged officers from adopting special methods. Perhaps they had partaken too deeply of the idea that defense was passive, or perhaps they were too absorbed in their own problems to look ahead. It was not a view restricted to infantrymen or cavalymen, so it was not simply a matter of un-technical officers avoiding hard thinking on artillery.

Nor had the artillery thought hard enough, even within its role of supporting others. Artillery officers took part in planning attacks, but accorded other branches of the army priority. Seldom was something done just to suit the artillery, and even technical impossibilities could not stand in the way of someone else's desires. Some of the first artillery pamphlets were an explanation for the infantry about why, no matter how careful the gunners were, some shells would fall short, and thus the infantry might need to withdraw from the foremost trench to avoid risk. The segregated nature of pre-war training left infantry officers ignorant about the artillery but expecting perfection; nobody had told them, or showed them, what artillery really did. Effective bombardments without enough shells were just as impossible as perfect accuracy.

GHQ's Role

Throughout 1915 the commander-in-chief of the BEF, Sir John French, took a largely supervisory role in operations. He paid even less attention to artillery matters, focusing his attention on the shell (and gun) shortage. Sir John did not quite grasp the nature of the artillery planning at Neuve Chapelle, and thought the plan centered on artillery neutralizing the Germans when in fact it sought destruction. ⁵⁴ French did little more than follow the conventional wisdom about artillery, thinking a bombardment necessary and supporting heavier, and explicitly destructive, bombardments later in the year. ⁵⁵ French was gravely concerned about the excessively wasteful attack at Aubers Ridge, intervening in Haig's handling of the battle and afterwards pondering "whether we ought not but to stand altogether on the defensive [un]til an adequate supply of HE is available." ⁵⁶ He listened to the concerns of Major-General du Cane, GHQ's Artillery Adviser, whom he thought very able, but did little to implement any suggestions. ⁵⁷ On the whole, French was a hands-off commander-in-chief, not technically minded, who only acted slowly on any suggestions from subordinates. The shortage of guns and shells could not be ignored, but he had few new ideas about how to use the artillery that was available.

Although not getting much direction from the commander in chief, the General Staff at GHQ produced a series of information and training booklets. These started in December 1914, and about ninety were produced in the next year, but only a few dealt with artillery. Some were produced for home consumption rather than for the BEF, since there were more troops at home in training than in France and they needed up-to-date information. ⁵⁸ Others were to teach troops everywhere how to handle the new conditions of trench warfare and new

technologies; sometimes these only appeared months after the new equipment. ⁵⁹ There was no comprehensive series on combined operations or on artillery operations, nor was any artillery doctrine laid down. The BEF did not borrow French artillery concepts, although periodically some gunners compared British and French methods. For instance, in June 1915 the French were starting down the road to their 'artillery conquers, infantry occupies' doctrine, but the BEF did not publish the relevant pamphlet until November, while different British ideas were published in more detail in July. ⁶⁰ (Two important pamphlets are available as [Appendix 8](#) and [Appendix 9](#).)

French methods could be used to pressure the War Office. When the BEF learned how many shells the French used in a bombardment, it was used as grounds to demand increased British production. ⁶¹ Gunners were still content with their subordination to the infantry during the planning stages, whether the battle was intended as a breakthrough or a limited one to pin down German reserves. Strategy was allowed to drive tactics, and infantry tactics outweighed the artillery's concerns. Higher commanders launched battles knowing that preparations were inadequate but believing there were overriding reasons to press on, and artillerymen were willing subordinates.

Haig Takes Over

Over the winter of 1915-1916 the BEF was preparing for a great offensive, one that would finally win the war. The forces available were larger than ever, raising the question of how large the attack should be. There still were not enough guns to attack everywhere, so the width of the forthcoming attack depended on predictions of how much artillery would be available, and on yet another artillery formula: how much front the available guns could cover. In mid-December, the Loos figure (100 yards per heavy piece) was recycled, although it had already been labeled as inadequate *before* Loos, and was proven inadequate there. ⁶² Smoke and gas would be used as supplements, but at Loos these had proven terribly fickle, and eventually they would be dropped as significant elements of any major attack, and of any attack of any kind that had to be launched on a given day regardless of weather. (They were retained as possibilities for smaller attacks that could wait for favorable weather conditions.) By late January, GHQ switched to an estimate of about 75 yards per heavy piece, and when in 1916 more artillery arrived the attack was widened rather than the artillery density increased. ⁶³ To produce this figure, GHQ asked for data. The First Army reported on the battles of Neuve Chapelle, Festubert, and Loos, and derived a formula that told how many guns and shells a corps would need to take a thousand-yard-deep bite from German defenses.

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In this planning, however, one factor was missing: the strength of the German defenses. On paper, the same number of guns was adequate anywhere. Also, the formula recognized little difference between preliminary attacks and a decisive offensive. Artillery ratios hardly differed between types of attack, and both the First and Third Armies put forward plans for limited attacks that assumed ratios of 70-75 yards per piece. ⁶⁵ This was broken down as 100 yards per heavy howitzer, ⁶⁶ and the other heavy guns present lowered the overall figure. 75 yards per 'heavy' was already a considerable dilution from Haig's 1915 hopes. Before Loos,

he addressed the possibilities of both general offensives along 25 miles of front and small attacks only 3,000 yards wide. ⁶⁷ In both instances he advocated a ratio of about 40 yards per piece, 88 percent denser than he accepted in 1916.

To attack a strong position like Vimy Ridge or Messines Ridge, a higher gun density would be needed, but only for a Verdun-style attack with artillery conquering, infantry occupying. ⁶⁸ But this was not the style of offensive the British had used in 1915, nor was it the style they intended to use in 1916. This suggests there were actually three, not two, categories of attack: decisive, preliminary, and limited, the last only intended to seize a specific piece of ground at a minimum cost in lives, which brought it closest to bite-and-hold tactics. However, Haig had already rejected the 'limited' methods for use in a decisive offensive, and they were seen as not even fit for preliminary offensives, being of use only in local attacks. ⁶⁹ The calculations involved in rejecting bite-and-hold tactics deserve attention, since the debate about their worth continued after the war. The Allies were trying to win the war as quickly as possible, assuming that an earlier victory would save more lives than fighting a longer, slower war, even at a lower monthly cost. Thus, the breakthrough—the decisive battle—remained the goal, and this strategy drove operational planning. While Haig rejected a strategy of limited attacks, circumstances forced him not to launch preliminary attacks. There was not enough artillery for near-simultaneous operations, and the transport system could not move the guns fast enough from preliminary attacks to a main attack. ⁷⁰

1916

The Somme: Planning

Before tackling the details of the Somme offensive, it is worth taking a few moments to look at the planning process in general. It is important to understand who planned bombardments, and how. But first there must be a large caveat: circumstances changed over time, with different personalities involved, and according to outside pressures. GHQ, thinking about domestic and alliance politics and available strength, would decide where the attack would take place. That determined which armies and corps were involved. Extra corps could be added to handle arriving troops, and sometimes different corps were brought in to replace those with inexperienced or out-of-favor commanders. If possible, the divisions slated for the attack would occupy their sectors and familiarize themselves with the terrain and the objectives.

GHQ would decide, in consultation with the army or armies, how long the bombardment needed to be. This was a strategic decision: it affected the time available to shift German reserves and British diversionary operations. The army decided, in consultation with its corps, how to allot the available heavy artillery, based on the strength of German defenses. The army also apportioned the counter-battery artillery. The corps would take its artillery and consult divisions on which targets within their sectors were most important. The corps also commanded spotting aircraft and balloons, so the corps headquarters would prioritize air-artillery co-operation. Infantry divisions would, after consulting their brigade and sometimes even battalion commanders, draw up lists of targets facing them, and discuss them with the corps' other infantry divisions. The infantry thus had a great deal of input into what was

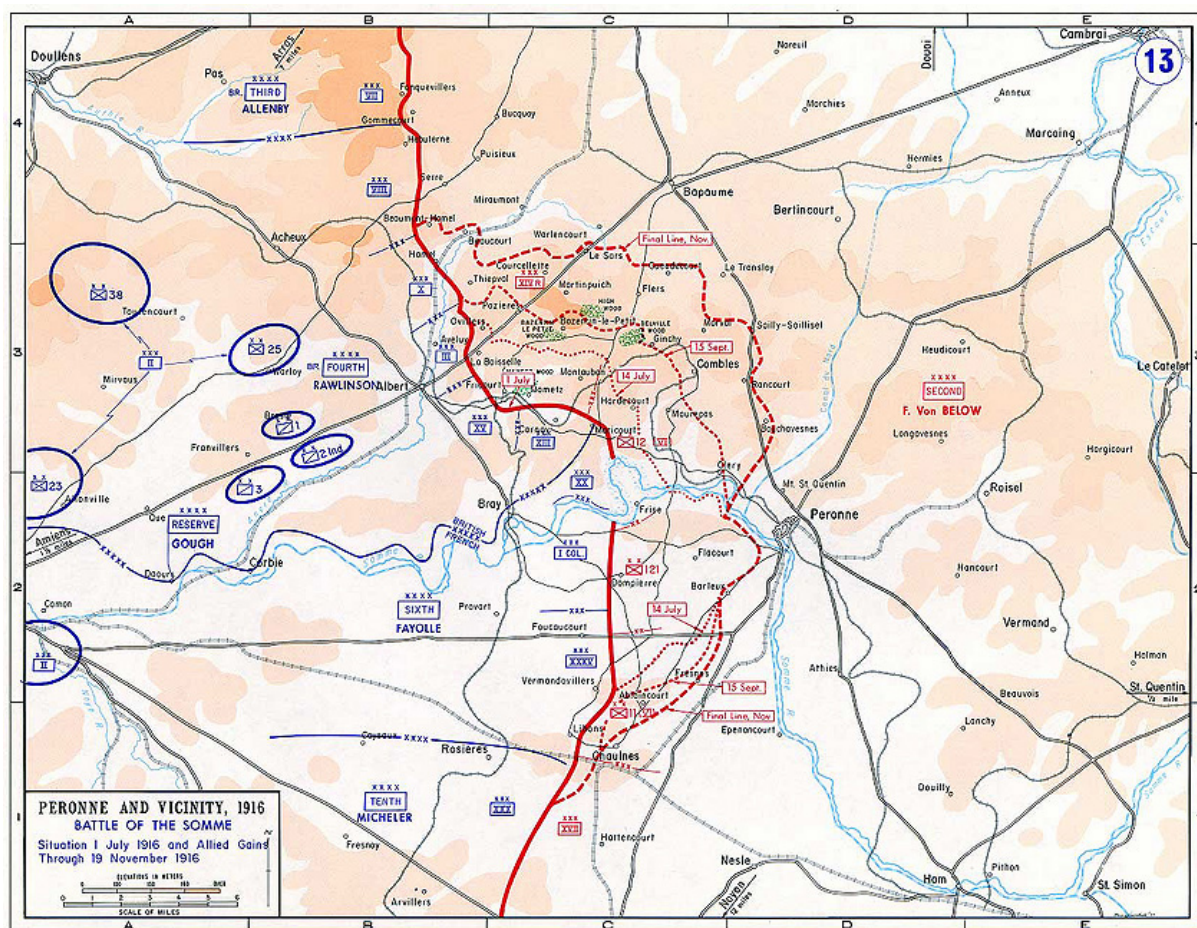
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shelled, as long as there was adequate time to plan, a caveat that typically restricted this system to the preliminary bombardments. During a battle, as infantry divisions were rotated through armies and corps, they lost local knowledge and their contributions would be limited to looking at maps. Any real familiarity with terrain and defenses then came from corps headquarters, and the infantry battalions naturally felt divorced from the decision-making and complained even more bitterly if something went wrong. However, as [Appendix 13](#) shows, the BEF paid little attention to artillery when training for attacks.

It is also worth noting who went to planning meetings. At the division level and above it was typically a maximum of three men per unit: the commander, the senior artilleryman, and the chief of staff, but the artilleryman was often left out. When the infantry brigades or battalions were consulted, typically only the commander took part. Artillery brigade commanders did not participate. Thus the men around the table were overwhelmingly infantry officers, with an infantry perspective. Artillerymen were there to discuss how to do what the infantry wanted, suggesting alterations to take advantage of such things as enfilade fire but with sufficient clout to make only marginal changes. When an operation was small, and planned around artillery support (such as some of the small attacks in 1918), participation was more equal, with infantrymen actually listening to artillerymen. The major offensives had to be built around broad-front advances, however, and had less room for local variations. The armies set major factors, even including the pace of the infantry advance. There was little for the artillery or infantry to do at the lower levels beyond settle details. Through the entire planning process it mattered that the artillery would not be going "over the top." Artillerymen knew their lives were not the ones in danger, and it reinforced their tendency to defer to the infantry.

With that introduction to the generalities, we will now turn to the Somme in particular. ([Map 13](#) shows the Somme sector.) Many historians have studied the Somme attack. ⁷¹ There is no need for an exhaustive re-examination, but some points in the argument between GHQ and the Fourth Army should be emphasized. The argument was really between Haig and Sir Henry Rawlinson, the commander of the Fourth Army, who had commanded IV Corps in 1915 in a number of attacks under Haig's command. Haig clearly vacillated during the planning, mainly about whether the offensive was to be decisive or was part of the wearing-out struggle that would precede the decisive attack.

As shown in the previous section, this made no difference for artillery planning. The difference arose because Haig and Rawlinson had different responsibilities. Haig focused on strategic objectives and wanted a breakthrough, whereas Rawlinson had to solve the tactical problems and preferred to take a chunk out of the German line. Haig vacillated about whether the attack should be planned as a breakthrough from the very start, or whether a breakthrough could develop out of successive tactical gains. At one point he wrote, "I think such a plan [rushing the whole German defenses at once] would be impracticable against this position," but he had no comments to make about the bombardment. ⁷² The depth of the planned advance made a huge difference for the density of shellfire. Since there was no extra artillery available for a planned breakthrough, the amount of artillery fire was fixed, and by planning to advance 2,000 yards instead of 1,000 the density of shellfire was roughly halved.



Map 13. Somme sector, 1916 This map shows the Somme sector and the Allies' painfully slow progress in 1916 that did, ultimately, make the Germans withdraw to the Hindenburg Line.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

Another big argument concerned the bombardment's duration. Haig preferred a short bombardment, hoping to achieve surprise and rush through the successive German lines, assuming that a short but heavy bombardment would be enough to both demoralize the German defenders and seriously damage their positions. Rawlinson originally had no preference about bombardment length, saying both were demoralizing. Neither Haig nor Rawlinson paid much attention to the weight of the bombardment. Both assumed that there would be enough guns and shells and that the German defenses (trenches and wire obstacles) would be pummeled, so their plans moved on to dealing with the German infantry. As Rawlinson thought more about it, he was won over to a preference for a long bombardment, citing two reasons Haig could not gainsay. Whether the bombardment was long or short, the wire-cutting would take several days and thus negate the element of surprise. Second, the French (attacking on the British right) were planning a long bombardment, which would void any chance of surprise for the Fourth Army. Rawlinson also reiterated the arguments that a

long bombardment weakened morale more than a short one, maybe playing to Haig's obsession with German morale. ⁷³ In this Rawlinson seems strongly influenced by reports from Verdun:

Results have proved that the defenders though subjected to this very heavy fire were able at the moment of assault to man the remnants of their trenches and bring the enemy to a standstill. All that artillery can definitely accomplish is a diminution of the material means of defence and wear and tear of its moral [sic]; it cannot ensure their destruction. ⁷⁴

Rawlinson's sound reasons won GHQ's grudging support, and for a few weeks Haig talked about only advancing as far as the artillery could prepare the way. ⁷⁵ However, as usually happened, Haig's confidence rose as the offensive neared and, only four days before the bombardment was to start, GHQ resumed meddling. ⁷⁶ Their idea was to save shells during the bombardment and not fatigue gunners, so that the expected success could quickly be exploited. ⁷⁷ Rawlinson argued back, quoting some of GHQ's own (earlier) arguments. They compromised; Rawlinson trimmed one day off the planned bombardment, but not as much as GHQ wanted. ⁷⁸ (The reduction in the planned bombardment did not affect the results, since it was also prolonged two days due to weather.) Through all the various plans, Haig treated initial success as certain and devoted his attention to the later stages of the battle. Rawlinson, being responsible for ensuring that initial success, was less confident than Haig.

In this battle of the memos there seems to have been very little input from the artillerymen. Haig does not mention any discussions, but Rawlinson sometimes talked matters over with his Chief of Staff, Archibald Montgomery, who happened to be an artillery officer, as well as with Noel Birch, his titular artillery adviser. ⁷⁹ In the midst of the planning Birch was elevated from Major-General, Royal Artillery (MGRA) with the Fourth Army to MGRA at GHQ, but the change made no difference to the debate. He had not been Rawlinson's reason for wanting to limit the attack, and he did not suddenly dominate Haig's thinking. That artillerymen had so little input into planning serves as a silent reminder that they saw themselves as subordinate (if executive) officers who worked within the operational framework devised by others.

Density of the Bombardment

The Fourth Army and GHQ both agreed, throughout the entire planning process, that there was enough artillery for the front involved. Haig's and Rawlinson's diaries reveal few concerns about the quantity of artillery and ammunition. ⁸⁰ Both accepted that one heavy gun per 75 yards of front was enough to clear the way for the attack. If more guns had been available, they might have gone into thickening the support for the Somme, but might also have been used for a preliminary attack elsewhere. In 1916, preliminary attacks to pin down German reserves had to be rejected because there were not enough guns to support both main attack and preliminary ones, and a 20,000 yard-wide main offensive was sacrosanct—until after 1 July. After deducting guns to support the 20,000-yard main attack, there were not enough for preliminary attacks anywhere else. The possibility of shifting guns from one to the other had been examined, but was ruled to be too slow; the main attack could not lag far

behind the preliminaries, else the Germans would reconstitute their reserves and the effect of the preliminary attacks would be lost. ⁸¹

Certainly the Somme offensive was *not* intended to mimic the Germans at Verdun, with artillery replacing infantry as the assault arm. Such attacks had their place in British strategy, but they were not thought of as war-winners. The Somme attack more than met the 75 yards per gun yardstick (all corps involved had considerably more than one heavy per 75 yards, as much as one per 40 yards), and the German trenches and wire were expected to prove no significant obstacle. Obliterating these so that the British infantry would have a fair fight against the German infantry was the implicit purpose of the bombardment, although there were certainly features of the bombardment designed to kill as many Germans as possible. Official policy was that the bombardment should be "continued until the Officers Commanding the attacking units are satisfied that the obstacles to their advance have been adequately destroyed." ⁸² GHQ never made Rawlinson's rash promises of annihilation of the Germans in the bombarded area, which suggests more realism than GHQ is sometimes credited with. Rawlinson was also being deliberately optimistic, and speaking to boost morale. That there was also to be a barrage in addition to the bombardment is adequate proof that Haig and Rawlinson knew German infantry and machine-gunners would survive. However, they did apparently believe that the German wire would be entirely swept away and the trenches and strongpoints so heavily damaged that the BEF's numerical superiority in infantry would be decisive. The order of the day on the eve of the offensive pointed out that the Germans only had 32 infantry battalions (with 65 in reserve) in the area attacked by 13 British divisions. ⁸³ Rawlinson wrote glibly of "destroying" and "pulverizing" the entire German front line and the fortified villages, and "beating down" defenses. ⁸⁴

GHQ official doctrine approached French thinking, thinking that destruction of German positions was the first priority. ⁸⁵ Written in April 1916 and issued in May and June, *Artillery in Offensive Operations* was the BEF's

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Under present conditions, no offensive operation can be expected to achieve complete success unless both the preparation and support by the artillery are effective. ... The first and most essential element of success is that the front selected for attack should admit of a full development of artillery fire, and of complete co-operation between the artillery and the infantry. ...

The preliminary bombardment is designed to achieve a certain purpose, namely, to enable the infantry to enter and penetrate the enemy's position: for this his works and the obstacles protecting them must be adequately destroyed, and his morale shaken. The extent of the ground to be bombarded will ... in all cases include, in addition to the destruction of the enemy's front-line system on the front to be assaulted, the next line in rear, and all communication trenches leading from it towards the front line. ...

Shortening the period may give the advantage of surprise, and may prevent the enemy bringing up more artillery to meet the attack. On the other hand, it will entail a much heavier expenditure of ammunition of the heavier natures, and a short bombardment, however

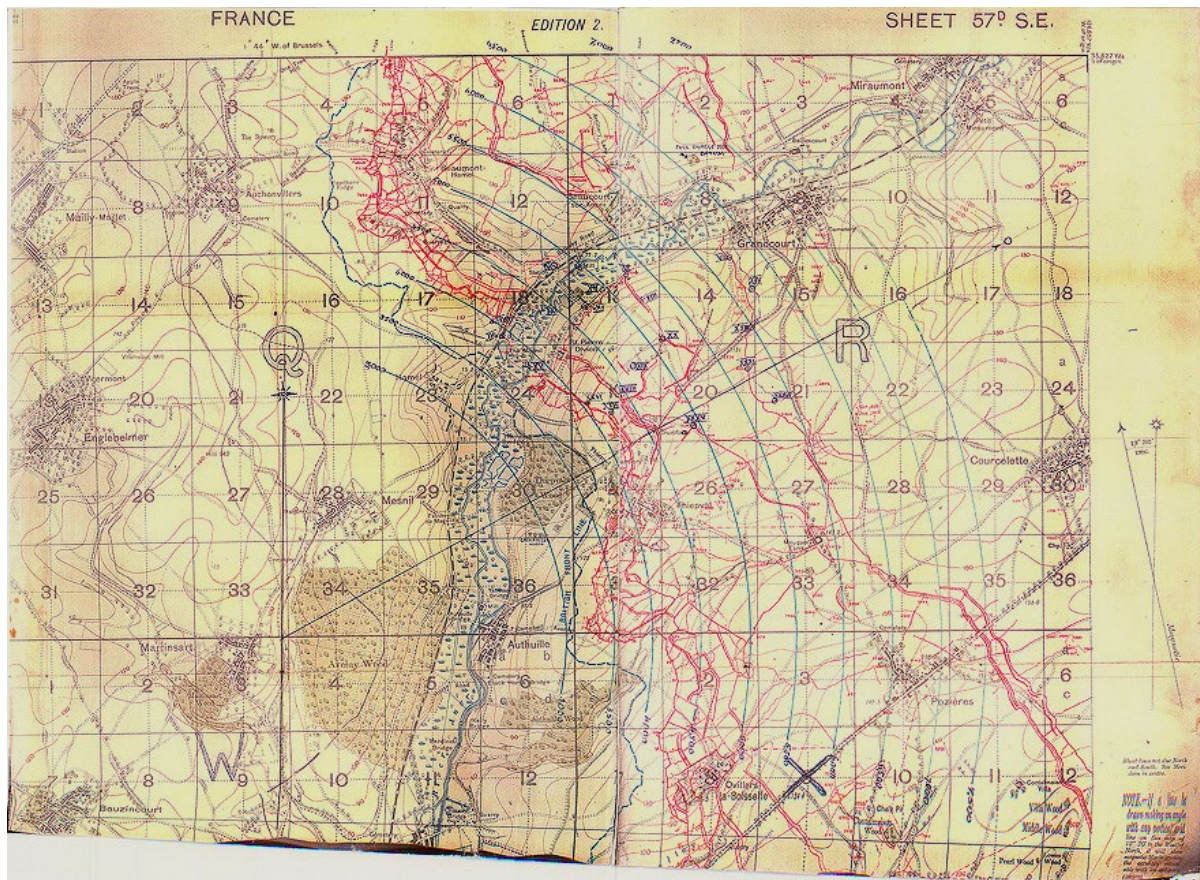
intense, may not have the same effect on the enemy's morale as the protracted strain of some days' exposure to constant shell fire.... Judging [from experience] ... it cannot be said that the high road to success lies either in a short "hurricane" attack or in a protracted bombardment. The duration and character of the bombardment must primarily depend on the strength of the enemy's works, and the artillery available for the attack, but many other factors must be considered by the general officer commanding the force, with whom the decision must rest. It is the duty of the artillery commander to place before him the technical considerations involved. ... In some cases an attack must be launched at a pre-arranged time, whatever the cost, and the responsibility of the artillery commander is then limited to doing his best to have the preparation as complete as possible by that time. But when this is not the case, it is the duty of the artillery commander to inform the general officer commanding if he considers the attack should be deferred in order to allow of further artillery preparation. The completeness of such preparation must, however, always be a relative term, and many considerations other than the purely artillery one must influence the decision. ⁸⁶
(The full text is available as [Appendix 12](#).)



Bombardment of the Schwaben Redoubt, July 1916. A heavy bombardment did not necessarily mean firing many shells all at once. The Schwaben Redoubt was a strongpoint facing VIII Corps during the battle of the Somme, and its chalk lines show clearly; positions in chalk made it relatively easy for observers to direct fire since they showed up so clearly.

Source: IWM photo Q8.

The pamphlet concluded with suggestions on how much ammunition to use for this level of destruction. French and German rules-of-thumb were mentioned, but the numbers recommended were British ones, simply repeating the lessons from Loos. But (Haig's) First Army had already denounced the Loos ammunition allotment, saying it "did not allow of a thorough bombardment."⁸⁷ Why there was such a change in opinion in the next few months is unclear, but, at least on paper, the BEF was shifting to an ammunition allowance known to be inadequate. There seems to have been a mental gap in the General Staff regarding artillery.



Map 7. Battery map, Somme sector, c. mid-1916 This is typical of the maps that every battery was issued for every position that they occupied. It shows the battery's arc of fire, and the targets within that arc. Along with a registration book, this allowed the battery to engage the targets quickly. While there must have been millions of battery maps produced during the war, this is the only example that I have found, because they were so ephemeral.

Source: Author's collection

On paper, BEF planners acknowledged that "guns formed the 'iron framework of battle,'" but they qualified this so heavily that anything else would take priority. If strategy called for an attack in a particular sector that was not suited to the artillery, then strategy trumped the "iron

framework of battle." If the pace of an advance needed to be increased, then the attacks went ahead without an adequate preliminary bombardment. But looking at artillery in terms of X heavy guns per thousand yards of an offensive sector mistook the means for the ends. The requirement was not for a certain number of guns (or shells) per yard of front but for adequate results against German defenses. ⁸⁸ It simplified planning to calculate numbers of guns and shells and assume these would do the job, but this ignored what the Germans were doing. ⁸⁹ Not until the pious phrases about infantry-artillery co-operation became reality, rather than the artillery being the infantry's adjunct, would the situation improve. This really means that a change was required in the rest of the army, since the artillery hardly wavered in doing what others thought best, not what best suited themselves. (Map 7 shows one battery's part of the Somme sector and its targets during normal trench warfare, aside from the bombardment.)

Wire-cutting

If they argued about the duration of the bombardment, GHQ and the Fourth Army eventually agreed about wire-cutting. Obviously the German wire had to be cut for the attack to succeed. Experiments with new fuses and methods were ongoing, and eventually general procedures evolved. ⁹⁰ Test results went out to the army hot off the presses, with rush editions even being printed in the final days before the Somme bombardment. ⁹¹ (Two of the pamphlets are available as Appendix 10 and Appendix 16.) Planners received guidelines on how many shells it took to cut through a given quantity of wire; the guidelines were revised in the June edition, having been reduced because experience showed that the guidelines were actually too high.

Throughout 1916, wire-cutting was a difficult operation, requiring considerable time and skill. As the Germans added greater depth in their defenses, it became more important to cut distant wire, an even more difficult target. Grass grew up in wire entanglements, making them almost impossible to spot from aircraft, while the wire covering the German second line was seldom visible from the British front lines. Since shrapnel, which lost effectiveness at longer ranges, was the best shell available to cut wire, there was an additional difficulty in cutting distant wire: field artillery might not be able to reach the wire at all, and even if it could it would require an inordinate number of shells. This meant that the medium artillery (4.7-inch and 60-pounder guns) had to help, and there were not enough mediums for their other responsibilities (mainly harassing fire and counter-battery work). As a result, distant wire-cutting was more often honored in the breach than creating an actual breach in the wire.

Wire-cutting would improve in speed and ease with the availability of the "106" fuze, which allowed HE to be used instead of shrapnel and also allowed howitzers to supplement field guns. However, despite a paper in-service date of March 1916, ⁹² meaningful quantities only arrived in early 1917. Lacking an easy way to cut wire, the only alternative was to accept the delay and fire deliberately and carefully. The original Somme bombardment plan had scheduled five days of wire cutting. Poor weather caused the bombardment to be stretched to seven days. The extra time did balance the weather-related problems, and the wire was adequately cut. ⁹³ Some units realized the German wire could not all be swept away, and that

only gaps would be cut. III Corps lacked time and shells and concluded that, "It is therefore for the infantry to state what wire can be left [un-cut]." ⁹⁴ This shows yet another way that artillery planning was subordinated to the infantry, for it was the infantry who wanted all the wire swept away even though this put severe strain on guns. The Fourth Army's artillery files show the trouble caused (mainly gun breakdowns), yet the artillery never asked for a change of plan.



Shell-torn barbed wire, near Mametz, July 1916. While heavy shells could cut gaps in barbed wire, as this picture shows, they created another obstacle: craters. Until the 106 fuze was available in large quantities in the spring of 1917, the most effective weapon for cutting the bulk of barbed wire was 18-pounder shrapnel fire.

Source: IWM photo Q832.



Captured German trenches, Somme sector, July 1916. The German defenses are not very clear in this photo, but the barbed wire is clearly well cut, and the ground is not badly churned by shellfire. From the white chalk showing on the ground, the German trench seems to be dug along the military crest in full sight of the British lines. This sort of forward-slope position (and the gentle slope involved here) were both typical of the Somme sector, and offered the best possible conditions for British artillery weapons and doctrine of the period.

Source: IWM photo Q93.

Ammunition Supply

GHQ still had to worry about ammunition supply. Production was increasing in quantity, but there was no great surplus and economy was still desirable. Shortly after Loos, the question of short or long bombardments was again examined with a view to economy, this time contrasting British figures with a captured German paper.⁹⁵ The Germans relied upon short, intense bombardments to neutralize the defenders, and used two-thirds as many shells as the British. The BEF misused the data by ignoring the German purposes. Instead they mixed British ideas about destruction with German data about neutralization. Also, now that the BEF had more guns and shells, they questioned whether surprise combined with weight of

fire might save ammunition. Not realizing the German intentions, the British fell between two stools: they thought intense bombardments might be more effective at destroying defenses (not true), but still wasted surprise by thinking of short bombardments that lasted several days. Concern over ammunition stocks persisted throughout the Somme campaign, and as early as 2 July Haig told Rawlinson that manpower was not a problem but shell supply was. ⁹⁶



German positions near Guillemont, September 1916. By September 1916, the British were using far more artillery for a given amount of German line than they had earlier in the year. This photo shows two results: the first is a substantial number of German casualties, and the second is that the Germans were frequently only holding a line of shellholes rather than trenches with dugouts. While a shellhole line was harder for the British to identify on aerial photographs or from ground observation posts (and thus harder to shell accurately), it offered much less protection, and a large number of small shells could inflict heavy casualties. Yet the heavy bombardments cut both ways. The delays involved meant the Germans had time to reinforce their artillery and prepare to blast the British troops. The Somme fighting was rife with attacks and counterattacks.

Source: IWM photo Q1165.

Course of the Battle

There is no need here to chart the daily events of the battle of the Somme, but some trends are worth examining. After 1 July the active front narrowed, sometimes to exploit a success

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but more frequently to redeem a failure by focusing resources. The important point is that the artillery was more concentrated, and this increased the firepower density. This raised the density of typical bombardments, and the density also rose over time as commanders gained experience and found that a heavier bombardment typically saved their soldiers' lives. ⁹⁷ Bidwell and Graham, in *Firepower*, quote with approval a memorandum from Birch about this concentration of artillery. ⁹⁸ Birch wrote that, if artillerymen had been consulted, the guns would have been more concentrated from the beginning, ensuring the German trenches were destroyed. Yet he went on to say, "Presuming that this view had been accepted and that the German defenses had been totally demolished ... I do not consider that we should have been in a better position today, in fact not so good." ⁹⁹ (Birch's full report is available as [Appendix 18](#).) He was not being schizophrenic, but assessing the risks of a narrow penetration, against which the Germans would concentrate their fire and that would get flanking fire, against a broader advance. Birch was doing what other senior artillerymen did, looking beyond an artillery-centered viewpoint, considering matters as they affected the army as a whole and subordinating himself to that wider view.



German barbed wire, near Beaumont Hamel, October 1916. Cutting the barbed wire was always a major artillery responsibility. Here, 'knife rests' (wooden x-forms wrapped with barbed wire) have been shelled. Knife rests were relatively easy targets, as they stood fairly high and could be seen; the wooden frames were also fragile. However, no matter how well the artillery did its job of cutting the barbed wire, the wet ground here was another enormous obstacle to the infantry advance, one that the artillery were powerless to address.

Source: IWM photo Q1547.

Regardless, artillery was concentrated and its tasks eased because there were fewer breakthrough attempts, which helped allow for the increasing density of shellfire. Yet, as Prior and Wilson demonstrate, ¹⁰⁰ the concentrated artillery (to which Birch was opposed) did little good on its own, since the Germans could concentrate their fire just as much. Capturing German trenches became the goal instead of breaking through; seldom were objectives more than 2,000 yards away. ¹⁰¹ Often attacks were made as soon as fresh infantry arrived, before the artillery had time to smash German defenses. Yet the artillery did what they could, and the inadequate bombardments were a result of pressure from GHQ. British military doctrine talked about combined arms action, but it was only lip-service, and the results were infantry-centered operations with other branches supporting. The artillery had to do its best in the time allotted, and postponements were more often made because of weather (which affected infantry and artillery) than to allow more thorough bombardment. Through the battle of the Somme, the task of simply blasting trenches dwindled as a part of the artillery's duties,

although weight of bombardment did not; what happened was that other work grew more rapidly. Aerial spotting developed quickly, improving bombardment accuracy, but it was more important for counter-battery work. Counter-battery work became more important after the British artillery was, finally, strong enough to blast the Germans out of any given trench. Once that happened, the Germans changed their defensive tactics, using more reserves, more counterattacks, and more artillery. Since the British artillery still had to pound the infantry's objectives, but now also had to fire on German reserves and artillery as well, either attacks needed more preparation time or they went ahead without a thorough bombardment. The creeping barrage also developed rapidly, and attention centered on these newer parts of artillery work. The British changes were gradual, fixing problems and improving on successes. Commanders were too busy during the fighting to be more reflective, and extensive changes had to wait until a lull in the fighting.

Conclusion

In retrospect, the bombardments of 1914 through 1916 look amateurish. Yet at the time, most were on the cutting edge of technique and technology. It is critical in reviewing bombardments from much of this period to remember that German defenses were lighter than later in the war. If British bombardments of 1915 were lighter than in 1917, they had less work to do. There was less barbed wire, fewer trenches and pillboxes. But there were still too many instances of inadequate bombardments, for two reasons. First, it was sometimes politically imperative to attack, usually because of French pressure on the British to 'do their share.' Second, there were times when the generals simply got it wrong. Lacking any experience with trench warfare, they had to improvise until experience was bought with lives. There were still errors of judgment, typically the product of thinking that the BEF could fix its failures while the Germans would sit still. The Germans did not. Lacking any idea when the war was going to end, and hoping for decisive victory rather than merely to exhaust the Germans, the constant goal was a breakthrough. If desirable at all levels, from the grand strategic to the tactical, it proved to be impossible. Artillerymen consciously held themselves subordinate to the combat branches and did what they could to help, which was not always what was best.

Notes:

Note 1: *FSR 1909*, 135. [Back](#).

Note 2: *Ibid.*, 16-7; *FAT 1914*, 228. [Back](#).

Note 3: *FSR 1909*, 166. This shows a strong concern with the element of surprise. [Back](#).

Note 4: *FAT 1914*, 230-1. [Back](#).

Note 5: WO33/701, Report of the Committee on Siege Artillery Material. [Back](#).

Note 6: Haig Diary, 23 September 1914. [Back](#).

Note 7: WO32/5150, French to War Office (hereafter WO), 10 October 1914; and also the letters of 29 and 30 September 1914. [Back](#).

Note 8: OH 1915, vol. 1, 18. [Back](#).

Note 9: A. H. Hussey Diary, RAI Military Document 1175 (hereafter Hussey Diary), 18 December 1914. Hussey also commented on the attack more as an observer, without suggesting he should have involved himself more. [Back](#).

Note 10: Bethell, *Modern Artillery in the Field*, 344. [Back](#).

Note 11: Field-Marshal Earl French of Ypres diary, IWM (hereafter French Diary), 10 and 14 December 1914. [Back](#).

Note 12: GHQ letter OA816, 12 December 1914, WO95/688. [Back](#).

Note 13: Smith-Dorrien to von Donop, 20 December 1914, WO79/84; to French, 19 December 1914, WO159/215. See also Smith-Dorrien's memo, 10 December 1914, WO95/630. [Back](#).

Note 14: Haig Diary, 6 January 1915. [Back](#).

Note 15: Smith-Dorrien to French, 19 December 1914, WO159/215. [Back](#).

Note 16: "Dossier," Sir Stanley von Donop papers, IWM. Later there were tests of chain-shot (ammunition that split into two halves, connected by a chain) to determine its utility in cutting wire, which turned out to be poor. The RA had predicted it would be ineffective, but Lloyd George, Minister of Munitions, insisted on tests. SUPP6/169, Annual Report of the President of the Ordnance Committee, 1914. [Back](#).

Note 17: French Diary, 27 December 1914; Montgomery-Massingberd papers, LHC, file 5/7. [Back](#).

Note 18: Montgomery-Massingberd papers, file 5/7; WO158/275, 29 January 1915. Smith-Dorrien was particularly interested. [Back](#).

Note 19: Haig Diary, 24 February 1915. [Back](#).

Note 20: Prior and Wilson refer several times in *Command on the Western Front* to Rawlinson planning the bombardment based on tests and data. I believe they have mistaken the wire-cutting tests for bombardments tests. [Back](#).

Note 21: Rawlinson (commanding the attacking corps) wanted several hours of bombardment, Mercer (First Army's Artillery Adviser) several days. WO158/374. [Back](#).

Note 22: Haig Diary, 28 February-3 March 1915. [Back](#).

Note 23: Haig Diary, 28 February 1915. [Back](#).

Note 24: E.g. Montgomery-Massingberd papers, file 5/7. [Back](#).

Note 25: WO106/388B, Indian Corps at Neuve Chapelle; Montgomery-Massingberd papers, file 5/7. Haig and Hussey diaries, 17 March 1915, Mercer report to Haig, 21 April 1915, WO95/155. [Back](#).

Note 26: Memorandum, 15 March 1915, WO158/17. For Rawlinson, see Prior and Wilson, *Command on the Western Front*, 77-80. Rawlinson may have invented the phrase. [Back](#).

Note 27: See note 13 supra. [Back](#).

Note 28: The distance would vary with the number the British guns and the strength of the British infantry, but also according to the German defensive scheme. [Back](#).

Note 29: Haig and Hussey diaries, 20 April 1915. [Back](#).

Note 30: WO95/155, handwritten note by William Robertson (CGS at GHQ), 10 May 1915. [Back](#).

Note 31: GHQ OAM217, 11 May 1915, WO95/155. Although OAM 217 was dated 11 May, its essential message—stop the attack—was telephoned early on the 10th. To be fair to Haig, GHQ's standard of "effective" preparation was one that could only be judged in hindsight, and thus was little use for planning. However poorly worded, French's intention was clear: he wanted deliberate bombardments. [Back](#).

Note 32: Haig Diary, 10 and 17 May 1915. [Back](#).

Note 33: Haig Diary, 6 June 1915, emphasis in original. [Back](#).

Note 34: "Secret Memorandum" from 1st Army, 18 September 1915, WO95/728. [Back](#).

Note 35: Haig Diary, 6 June 1915. [Back](#).

Note 36: GHQ OA290, 27 May 1915, WO158/17. [Back](#).

Note 37: Robertson to Haig, 12 May 1915, WO95/155. [Back](#).

Note 38: *OH 1915*, vol. 2,45. [Back](#).

Note 39: E.g. WO95/155, 16 May 1915. [Back.](#)

Note 40: 1 June 1915, WO95/155. [Back.](#)

Note 41: WO95/154 and WO95/155, 1-6 June 1915. [Back.](#)

Note 42: OAM424, 19 June 1915, WO95/156. [Back.](#)

Note 43: WO95/155 (13 April 1915), and WO95/158 (6 September 1915). [Back.](#)

Note 44: Rawlins Papers, Third Army Royal Artillery HQ letter, 4 April 1918. [Back.](#)

Note 45: On the evolution of German defensive doctrine, see Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Leavenworth, KS: Combat Studies Institute, 1981); available online at <http://www-cgsc.army.mil/carl/CSIPUBS/Lupfer/lupfer1.htm> [Back.](#)

Note 46: WO95/157, 23-24 August 1915. [Back.](#)

Note 47: Haig Diary, volume 5. [Back.](#)

Note 48: WO95/728. [Back.](#)

Note 49: Haig Diary, 8 and 18 October 1915. [Back.](#)

Note 50: There are far too many for even a reasonably comprehensive list, but see WO95/155 1 June 1915; WO95/156, 6 June 1915 and 30 July 1915; Haig Diary, 1 March 1915 and 8 August 1915; Sir Richard Butler papers, IWM, memo c.29 June 1915; WO95/160, 2 and 9 November 1915. An interesting comparison can be made between WO95/268, 16 February 1915 and WO158/18, 12 October 1915, both concerning attacks on Messines Ridge. [Back.](#)

Note 51: WO95/156, 4-6 June 1915, Haig Diary, 6 June 1915. [Back.](#)

Note 52: Rawlinson Diary, 7 June 1915. [Back.](#)

Note 53: Rawlinson Diary, 8 and 17 June 1915. [Back.](#)

Note 54: French to WO, 27 March 1915, WO32/5152. [Back.](#)

Note 55: French Diary, 28 February 1915, 9 and 13 May 1915, 15 June 1915. [Back.](#)

Note 56: French Diary, 12 May 1915. [Back.](#)

Note 57: French Diary, 13, 19, and 22 May 1915, 22 August 1915, 4 and 6 October 1915; letter, French to WO, WO32/5152. [Back](#).

Note 58: E.g., the "Notes from the Front" series. Semi-official notes circulated as well, for example those sent to the West Riding Division in G. Helps Papers, IWM. [Back](#).

Note 59: E.g., CDS49, 54, 92, 93, 82, IWM. All CDS and SS pamphlets consulted for this study are at the IWM. [Back](#).

Note 60: CDS24, "Object and Conditions of Combined Offensive Action" (November 1915), CDS50, "Tactical Notes" (31 July 1915). [Back](#).

Note 61: French to WO, 31 December 1914, WO32/5152, French Diary, 13 May 1915, "note on ammunition requirements for a bombardment," 2 October 1915, WO158/17. [Back](#).

Note 62: WO158/18, 14 December 1915. [Back](#).

Note 63: WO158/19, 22 and 18 January 1916. Experience from 1916 led to a general standard of 25 yards per gun for 1917. The Second Army set an "ideal" of 25-30 yards per gun in September 1915, but on this basis there were insufficient heavies for any sizable attack. Sir John Headlam Papers, RAI Military Document 183 (hereafter Headlam Papers), part 2, 11 September 1915. [Back](#).

Note 64: WO158/259, no date but c. 22 January 1916. Paradoxically, Festubert had seen the greatest shell density but the worst results: the formula called for 82 heavy pieces, about one per 30 yards of front. [Back](#).

Note 65: WO158/19, 29 January 1916, 21 February 1916. [Back](#).

Note 66: At this point, 6- through 9.2-inch pieces were called heavy; later only 8- and 9.2-inch qualified. In 1916, considering only 8- and 9.2-inch as heavy would have roughly halved the number of "heavies." [Back](#).

Note 67: Haig Diary, 29 June 1915, 8 August 1915. [Back](#).

Note 68: WO158/19, 25 May 1916; WO158/18, 12 October 1915; plans for each respectively. [Back](#).

Note 69: WO158/19, 16 January 1916. This is within a month of Haig replacing French. [Back](#).

Note 70: See Sanders Marble, "General Haig Dismisses Attritional Warfare, January 1916," *Journal of Military History* 65:4 (2001): 1061-4. [Back](#).

Note 71: Probably the best is Robin Prior and Trevor Wilson, *Command on the Western Front: The Military Career of Sir Henry Rawlinson 1914-18* (Oxford: Oxford University Press, 1992), but see also Martin Middlebrook, *The First Day on the Somme: 1 July 1916* (London: Penguin, 1984), which paints more of the ordinary soldier's perspective. [Back](#).

Note 72: Fourth Army Operations Papers, IWM, vol. 5, letter 4 (hereafter thus: Fourth Army Papers vol. 5, letter 4); note on GHQ's copy of GX3/1 of 3 April 1916. [Back](#).

Note 73: Fourth Army Papers, vol. 5, letter 10. Rawlinson watched German morale, but was not as fixated upon it as Haig. [Back](#).

Note 74: Field-Marshal Baron Rawlinson of Trent Papers, National Army Museum 5201-33-68 (hereafter Rawlinson Papers), Joffre's report on the Verdun attack of 13 April 1916 with Rawlinson's marginal notes. [Back](#).

Note 75: Haig Diary, 15 June 1916. [Back](#).

Note 76: Haig Diary, 18, 27, 29, and 30 June 1916. Rawlinson's confidence also rose: Diary, 29 June 1916. [Back](#).

Note 77: Fourth Army papers, vol. 5, letter 38. [Back](#).

Note 78: Ibid., vol. 5, letter 39. [Back](#).

Note 79: Rawlinson Diary, 4 March, 15 April, 1 June 1916. Of course, he probably talked with them more than this, but simply did not write it down. [Back](#).

Note 80: Haig Diary, vols. 8-10; Rawlinson Diary, May-June 1916. [Back](#).

Note 81: WO158/18, 14 December 1915. [Back](#).

Note 82: OAD876 (16 May 1916), WO158/223. [Back](#).

Note 83: OAD17, 21 June 1916. [Back](#).

Note 84: Fourth Army Papers, vol. 5, letters 6 and 10. It is not clear whether Rawlinson saw Joffre's report before or after his letter of 19 April 1916. [Back](#).

Note 85: SS98/4, "Artillery in Offensive Operations," April 1916. [Back](#).

Note 86: It should not be thought that the last comments were forced upon the artillerymen by the General Staff or formation commanders; drafts of the pamphlet exist in the Headlam Papers, RAI. Headlam was Artillery Adviser at GHQ when it was adopted. [Back](#).

Note 87: Advanced First Army, "Some Artillery Lessons to be learnt from the Recent Operations in September-October 1915," 7 November 1915, Rawlinson Papers, NAM. [Back](#).

Note 88: In some cases it was realized that adequate results could not be guaranteed: III Corps did not have time or shells to re-bombard a section of German trench not sufficiently prepared by the first shelling. V Corps BGRA diary (WO95/756), "Report on visit to III Corps", n.d., but before the Somme offensive (hereafter V Corps, "visit to III Corps"). This report is available as [Appendix 15](#). [Back](#).

Note 89: A detailed example of artillery planning, especially interesting for arguments between the artillery and the corps commander before the Somme offensive is X Corps BGRA diary (WO95/862) from April-June 1916. [Back](#).

Note 90: Hussey Diary, 30 October 1915; Haig Diary, 17 January 1916; Headlam Papers, part 2, 18 October 1915, 1 and 25 November 1915, 9 December 1915. Hussey noted the presence of most artillery generals in the BEF at one test. [Back](#).

Note 91: CDS93 ("Report on Experimental Firing ... at Calais"), November 1915; SS98/5 ("Artillery Notes: Wire Cutting"), February and June 1916. [Back](#).

Note 92: Information kindly provided by Mr. Mike Hibberd, formerly of the IWM. [Back](#).

Note 93: The *OH* mentioned only three places where wire offered any obstacle in the front line. The real problem was that the Germans were still strong, something patrol results showed; for whatever reason, this intelligence was ignored. See also Sanders Marble, "Artillery, Intelligence and Optimism: Wire-cutting during the Somme Bombardment," *Stand To!* 61 (April 2001): 36-39. [Back](#).

Note 94: V Corps, "Visit to III Corps." [Back](#).

Note 95: WO158/17, 19 December 1915. [Back](#).

Note 96: Fourth Army Papers, vol. 5, conference of Haig, Kiggell, Rawlinson, and Montgomery, 2 July 1916. Guns never ran out of ammunition unless because of tactical delivery problems, but sometimes stockpiles were low. XIV Corps BGRA diary (WO95/915), 11 July 1916. [Back](#).

Note 97: In August, XIV Corps used one heavy (8- or 9.2-inch) shell per yard of trench, or two 6-inch shells. By September, Reserve Army laid down a rule of four 4.5-inch or 2.5 6-inch or 1.5 heavy shells per yard. By October, the Canadian Corps pared this back to the August levels, but also were willing at times simply to blast German trenches: "The above sections of trench will be destroyed by deliberate shooting. ... No limit to number of rounds fired on each spot, except that each section of trench must be completely obliterated." XIV Corps BGRA diary (WO95/915), 16 August 1916; Canadian Corps RA diary (WO95/1059), 12 September 1916, 4 and 10 October 1916. [Back](#).

Note 98: Bidwell and Graham, *Firepower*, 100, n. 102. [Back](#).

Note 99: Memorandum, Birch to Kiggell, 9 July 1916, Rawlins Papers file 12a. [Back](#).

Note 100: Prior and Wilson, *Command on the Western Front*, 203-26. [Back](#).

Note 101: Some attacks were simply taking one enemy trench, and the army commander would intervene to the extent of ordering the registration of specific points. III Corps BGRA diary (WO95/690), 3 August 1916. [Back](#).

4. Preparing the Attack, Part II: 1917-1918

1

Introduction

Over the winter of 1916-17, the BEF digested the experience of the Somme. Two armies, nine corps, and forty-nine divisions had fought there for at least two weeks, and even more units had come and gone. This dwarfed the single biggest battle of 1915, which involved one army, three corps, and nine divisions. What is impressive, given the reputation of World War I generals for obstinacy, is the eager search for lessons. Very shortly after the Somme battles ended, both the Fourth and Fifth Armies compiled reports of 'lessons learned' with an eye to improving training and tactics across the whole BEF. ¹ (One of these is available as [Appendix 19](#).) This led to a new batch of tactical, planning, and training pamphlets. Unsurprisingly some of the many pamphlets published in 1916 only needed minor updating, while some were completely revised, and there were completely new topics to be covered. ² However, whatever details were updated or new wrinkles were added, the purpose of the bombardment—the obliteration of German defenses—was unchanged., although now new areas were covered.

The main planning guide, SS139/4, *Artillery in Offensive Operations*, was considerably improved and expanded, as the following passage indicates.

The rupture of the enemy's front ... entails the destruction of the obstacles to the infantry's advance and of the means of defence that support those obstacles; the moral and physical reduction of the defenders; and lastly a rapid and combined advance of all arms acting in close co-operation. ... Experience has proved that effective artillery preparation is indispensable to success.... Granted the vital importance of effective artillery action in the offensive, it follows that the general plan of attack must be such as to admit of a full development of artillery fire and of complete co-operation between the artillery and the infantry. ... For this it is not enough that the requirements in guns and ammunition should have been carefully estimated and adequately provided. The first and most essential element of success is that the front selected for attack should be of a nature to admit of this full development and co-operation. ... It is, then, the first duty of the artillery commander to place before the general officer commanding the force full particulars as to the manner in which the ground affects the efficiency of the artillery preparation and support, so that the latter may give due weight to such considerations in selecting the front of attack....

1. Object of the Preliminary Bombardment The task of the Artillery in an offensive battle is to prepare the way for the infantry and to support and protect the infantry throughout its progress. The preparation of the way is achieved by the preliminary bombardment which aims at—
 - a. the overpowering of the hostile artillery;
 - b. the physical and moral reduction of the enemy's infantry;
 - c. the destruction of material obstacles to the advance of the attacking infantry and of other defences. ...

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The artillery's task being to open the way for the infantry, its fire must be directed towards breaking down, firstly, the enemy's material powers of resistance, and secondly his means of directing his defence, incidentally thus increasing his demoralisation by causing casualties and inducing confusion. ... If the attack is to go through to as great a depth as possible, and if time allows, then certain points in the enemy's second line should be selected for destruction on the same principles as govern the artillery attack on the front system of defence. If, on the other hand, the attack has a limited objective, or if the attack of successive objectives spread over several days is contemplated, then there can be but little value in any extensive bombardment of the second line. ... But the first essential is to ensure the infantry's passage over the enemy's front line system of defence, and to take in chances in this respect in favour of more distant systems is manifestly indefensible.
(The whole text is available as [Appendix 20](#).)

Contrasted with the previous year's edition, there is better balance between artillery and infantry. Moving towards a genuine combined-arms doctrine, many sections were lifted straight from the infantry training pamphlet.³ Gone was the ominous comment about attacks going ahead with manifestly insufficient support, although the infantry were certainly sacrificed in many attacks in 1917. Improved communication was also stressed, perhaps so the infantry would not feel neglected. The artillery was not neglecting the infantry, but the nature of fighting was changing, with far more of the artillery's work being done out of sight of the frontline infantry. Thanks to new German defensive tactics, counter-battery work and targets in depth were more important than ever.⁴ This was a tribute to the Royal Artillery's half-success in 1916—with enough guns and shells to obliterate the German front line, they had forced tactical changes on the Western Front. But tactical changes did not bring the war, or even trench warfare, to an end.

The hopes expressed in early 1915—that more artillery would bring about a return to maneuver warfare—were false. British tactical changes also reflect the far greater skill, experience, and firepower of the infantry, which was increasingly comfortable with the artillery working elsewhere on the battlefield. Counter-battery fire became a higher priority than trench destruction, and would stay so for the remainder of the war. Greater firepower also made barbed wire less important, while preparing what would now be called the 'deep battle' was more so. Although breaking into the German defenses was now more likely, in the debate over bite-and-hold versus breakthroughs, the chances of a breakthrough were still small. This did not cause much change in Allied strategy, which still focused on driving the Germans out of France as quickly as possible. The strategic picture grew much more complex in April with the Russian Revolution, the American declaration of war, and mutinies in the French Army. British politicians (especially the Prime Minister, David Lloyd George) were increasingly reluctant to support unlimited offensives, but when push came to shove they authorized the offensives and saved the recriminations for their memoirs.

Perhaps the biggest change visible to the infantry was the declining importance of barbed wire. With new weapons and the new 106 fuse, wire-cutting became quicker, even though the Germans vastly thickened their entanglements. The fuze allowed howitzers to cut wire reliably. This had two effects: one howitzer shell could cut twice as much wire as an 18-pounder gun shell, and howitzers could also cut wire on a reverse slope (the far side of a hill), something guns could not do, and this

meant German positions there were now vulnerable. Despite new German tactics that put less emphasis on holding the front line (and even the entire first system of trenches, with frontline, support, and reserve trenches), bombardments grew longer. Because there was no longer much doubt the front line would be taken, operations now revolved on whether the second or third system could be taken in the initial rush. Not only were the German second and third trench systems now British objectives that needed thorough bombardment, the increased German emphasis on mounting counterattacks meant the troops in those systems and other reserves had to be bombarded. But increasing the depth of the objectives increased the number of targets while reducing the number of guns that could reach them. To do more work with fewer resources took more time. Even though new artillery units continued to flow from Britain to France during 1917, there were still never enough: demand continued to rise faster than supply. In 1918 the proportion of heavy artillery would be high enough to allow rapid saturation shelling of deep targets (at least where German defenses were weak), but this was not possible in 1917.

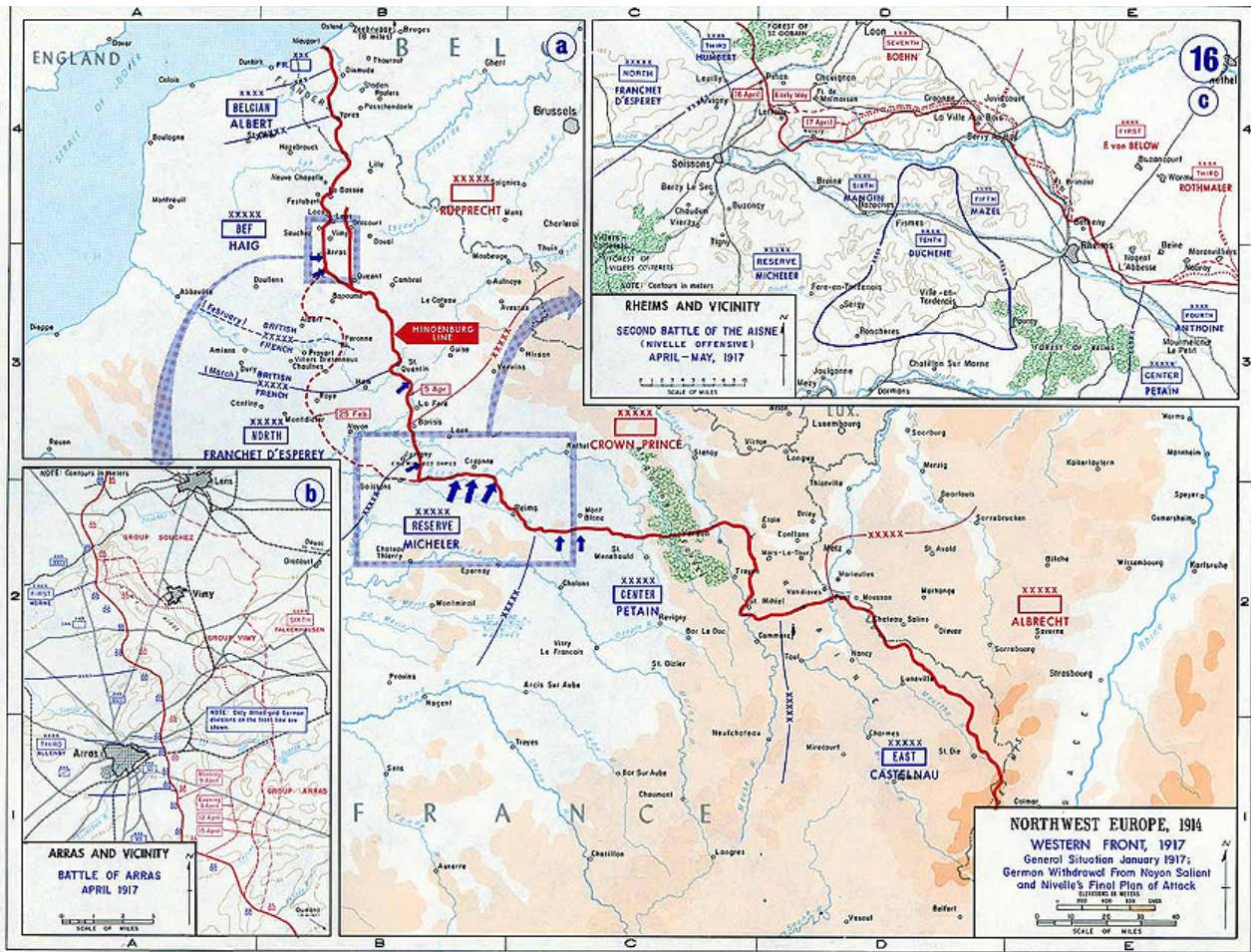
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Two examples will illustrate the changes. The Somme attack had been preceded by seven days' heavy bombardment, although only five days had been planned. For the Arras offensive, despite using much more heavy artillery, and starting preliminary elements of the bombardment weeks earlier, there were still five days of intense bombardment; the longer target lists simply took more time.

Arras: The Planning

The BEF's general goal at the beginning of 1917 was to improve on the previous year rather than to go down a new road. Bite-and-hold was not adopted as the main strategy, not least because it did not fit with Allied war aims. Some attacks with limited objectives were made, particularly to seize key terrain like Vimy Ridge, or Messines Ridge, and Hill 70 outside Lens. There was little chance of a German counter-attack once the BEF took these features, and these battles were set-pieces with, at most, very limited exploitation planned. Vimy Ridge and Messines Ridge were related to other battles nearby (Arras and Passchendaele, respectively), but the rest of the battle took place beside, not over, the ridges. In planning the first battle of the new year, there was a chance for new methods to be tried, but it was rejected for a variety of reasons, and evolution was chosen over revolution.

For 1917, the Allies first planned massive joint offensives—French, British, Italian, and Russian—to swamp the German reserves and force major withdrawals. (Map 14 shows the Western Front in the first half of 1917.) The British share of the Allied offensive was intended to be a resumption of the Somme offensive, but that idea was soon dropped and the task was handed to the Third Army, around Arras. In late January, at a conference of army commanders, the Third Army's commander (General Sir Edmund Allenby) produced a plan for a surprise attack. ⁵ He included 48 hours of intense bombardment, but the main emphasis was on surprise: "The object of this comparatively short bombardment is to obtain the advantage of surprise." ⁶



Map 14. Western Front, 1917, including Battle of Arras. This map shows the main developments of early 1917 on the Western Front. The Germans withdrew to the Hindenburg Line, dislocating the French spring offensive, while the British attacked around Arras.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

This plan was submitted before the Germans withdrew to the Hindenburg Line, which shortened their line and economized troops, many of whom went into reserve near Arras. Allenby judged that his attack would break through the thin German lines and that few reserves were available to fill holes. He was also implicitly showing more faith in the British infantry, judging that they could fight their way forward rather than just follow behind a barrage, a view that was very much in keeping with *Artillery in Offensive Operations*. GHQ did not criticize Allenby's assumptions; instead, it objected to the new methods. (These were not even terribly new: the Third Army had already submitted plans for an attack on Monchy-le-Preux with the same elements, and GHQ replied that Haig "approved generally of your plan.") 7 Haig personally took his time pondering Allenby's methods (at the conference he had reserved his comments), and leaned heavily upon his artilleryman, Birch, for analysis.

In the first follow-up discussions with Allenby, Haig promptly called on Birch for support, and many of Birch's main concerns formed the basis for GHQ's queries. ⁸ As Birch wrote:

So many thanks for your letter. It is very good of you to write so fully as I know how awfully busy you are.

I am asked by two direct questions by the Commander-in-Chief:—

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1. Are the Third Army using too much ammunition for destructive purposes and therefore wearing out more guns than necessary.
2. Will the nature of the bombardment unduly increase the wear of the guns.

... you certainly have more than enough ammunition to destroy every single yard of all natures of trenches as far as I can make out, and a good deal left over for Counter-Battery Work. ⁹

Birch was showing less confidence in the infantry by suggesting a heavy bombardment and complete wire-cutting. When Haig did give his views, he only noted that Allenby's plan was "bold." ¹⁰ Unfortunately for Birch, Holland had done thorough research and rebutted each point. ¹¹ GHQ was (as usual) worried about morale and wire-cutting, but it also thought the Third Army wanted too much destruction; finally, it deprecated the possibility of surprise. ¹² GHQ had not fully examined its own arguments. It said that surprise was impossible, but wanted a longer bombardment (to facilitate wire-cutting), but a less intense one that would destroy less of the German trenches. The Third Army answered each of these points, but by this stage in the process time was running short and GHQ had either to accept Allenby's plan or flatly over-rule it. Out-argued—there was only one hesitant "?" in the margin—GHQ used its authority and warned Allenby by kicking Holland upstairs to command I Corps. ¹³ In the grand tradition of British army intrigues, seniority played a role, for Holland was Birch's senior in the Royal Regiment of Artillery, so Birch was simultaneously senior (in position) and junior (in rank) to Holland; this is why Birch's letter to Holland opened in such a mild tone. ¹⁴ It should be noted that GHQ was not alone in its doubts, nor was the argument simply one pitting Birch versus Allenby with Haig and Holland as seconds. Some of Allenby's subordinates responsible for the actual attack were unconvinced by Allenby's plan, as was the experienced artilleryman Herbert Uniacke, who was brought in to oversee the actual planning. ¹⁵

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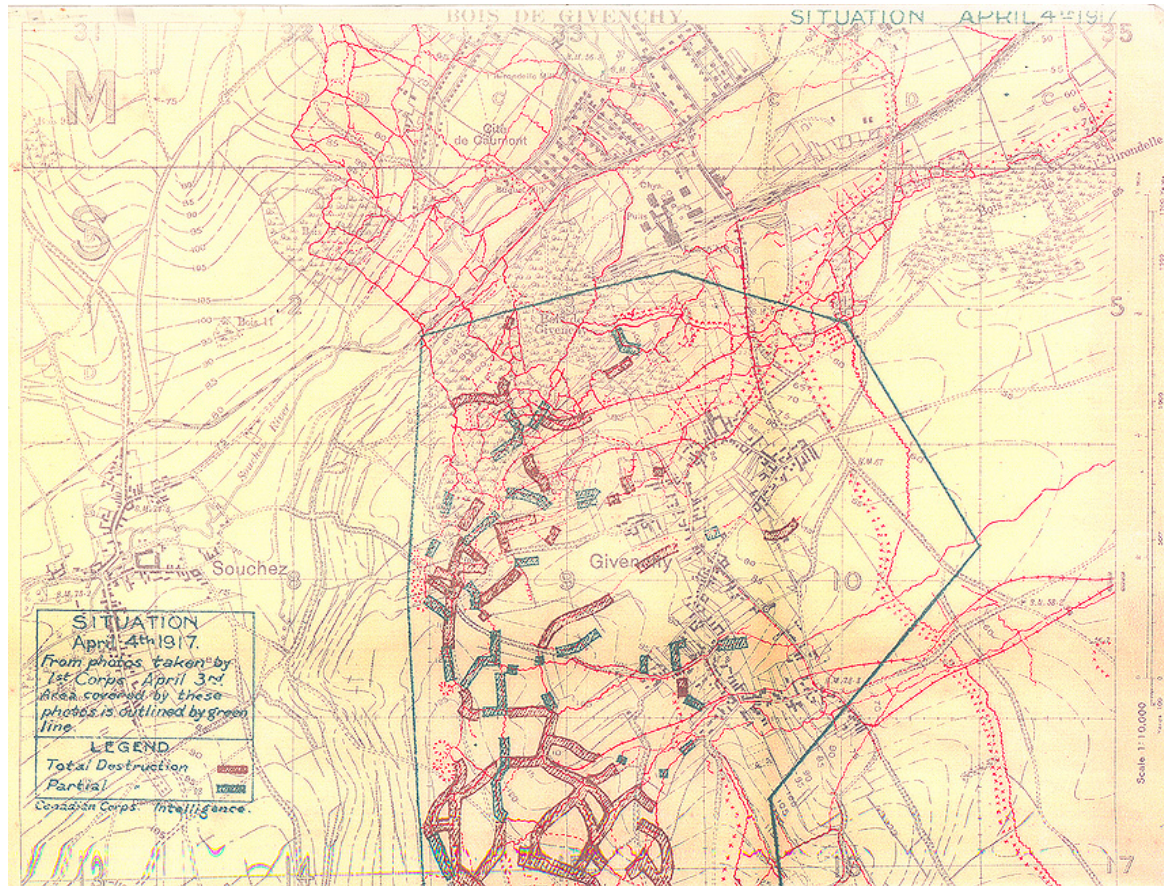
This is not the place to attempt a counter-factual investigation of whether the Allenby/Holland plan would have worked. ¹⁶ Some aspects of it were deeply flawed, such as traffic control that would let the cavalry through the streets of Arras to exploit the expected breakthrough, a point that did fail in April. Other aspects were suspect, such as relying upon the Germans to make mistakes, although this did happen. But it must be remembered that these were not the grounds on which GHQ rejected the plan. Haig and Birch over-ruled Allenby because he was not doing things the tried-and-trusted way. It is surprising that GHQ should have taken this line, preferring trench-warfare methods that had been anathema in 1915 to the more traditional ones to which it always gave lip service.

This in turn raises the question of Birch's influence over Haig, both in early 1917 and generally. *Artillery in Offensive Operations* had introduced a new scheme for artillery planning in attacks, dictating that each army's Major-General, Royal Artillery should decide the basis of bombardment

plans (albeit consulting widely amongst the troops who would actually be involved) and then co-ordinate the detailed planning. However, GHQ specifically noted that armies were to work within "the limitations imposed by the Commander-in-Chief." ¹⁷ Birch himself leaned toward offering the infantry heavy support, as much as they wanted, later writing to the Official Historian that he liked to plan for complete wire-cutting. ¹⁸ If the infantry (after discussions) asked for more support than was ideal, he felt they had their reasons and the artillery should do as asked, while working to persuade the infantry for the next battle. In general, Birch had intermittent influence with Haig. The two got along quite well personally, for in the dark days of early 1918, when there was little either man could do to influence the fighting, Haig selected Birch to motor around the rear areas with him. ¹⁹ However, although Birch wrote of Haig that "it was marvellous the way he did attend to me, and he was most interested in the artillery," yet Haig was entirely willing to over-rule the artillery: "poor Haig—as he was always inclined to do—spread his guns." ²⁰ It would always have been a struggle to persuade the man who drafted *Field Service Regulations* to re-think warfare, and Birch could not. His influence as a technical adviser was fairly constant: on questions of artillery material or tactics, Birch was consulted. But Haig saw artillery more in terms of tactics, and he was firm—to the point of obstinacy—about subordinating tactics to strategy. The relatively greater role Birch played at Arras may well have been because Haig was distracted by the Prime Minister's machinations at Boulogne, where Lloyd George was working to put the BEF under French control in hopes of avoiding another costly British offensive or paying the political price of removing Haig.

Arras: The Battle

After fighting amongst themselves, the BEF opened the battle of Arras against the Germans. The bombardment began on 20 March (Z-20) and the infantry assaulted on 9 April 1917. Whether or not it was due to so much high-level interest or the improved command arrangements, the artillery did its work well. The bombardment was the best to date (even too heavy on parts of Vimy Ridge), and the barrages worked smoothly. ²¹ Map 8 shows the bombardment in process. Allenby wrote his wife, "The artillery were brilliant, and the German guns were smothered from the start." ²² The infantry gained ground across the front. While there was no breakthrough, in some places the infantry advanced further than they would at the battle of Cambrai, noted for its near-breakthrough. As was ever the case in World War I, with movement and communications difficult to organize, the advance was not as smooth on succeeding days. Novel elements like smoke barrages and the 106 fuse ²³ had worked extremely well, but extending the supply lines forward across the churned battle zone was a slow process. The Germans reinforced, especially adding more artillery. In roughly one week there was a new equilibrium. The Germans had yielded the ground the British artillery could reach from its original positions and had brought up significant reinforcements. The impetus provided to the British advance by the bombardment had worn off. Had the BEF been operating on its own, the battle might have been broken off, but it had to be prolonged with a series of expensive and relatively unsuccessful attacks because the French armies had mutinied, refusing to attack. To pin down the German reserves and prevent any attack on the French, the BEF renewed its attacks. Conditions degenerated into fighting like that in the later stages of the Somme. Breakthroughs were impossible, and the large quantities of artillery on both sides dominated the fighting. The guns would bludgeon the way for infantry to take or re-take this trench or that.



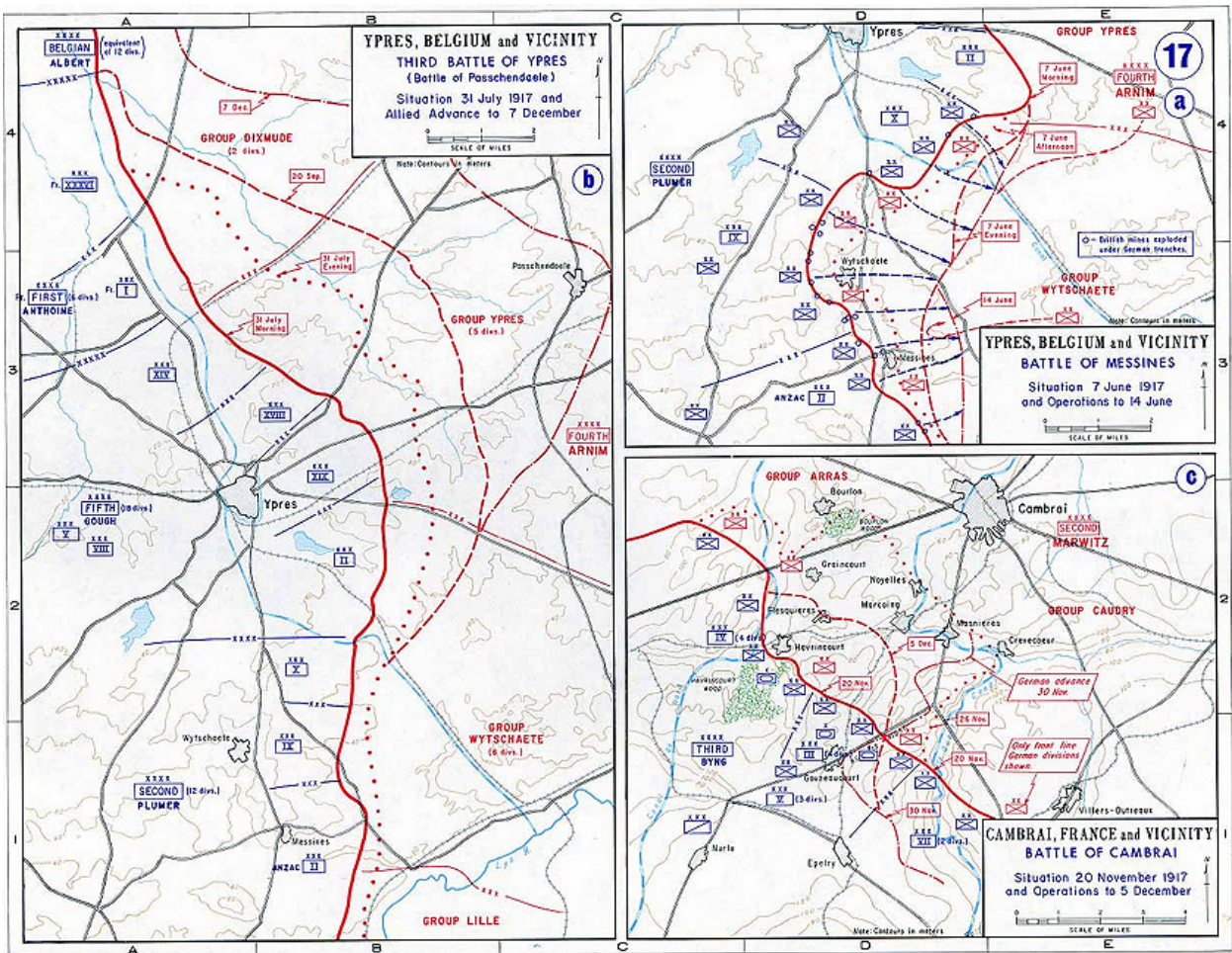
Map 8. Bombardment map, Vimy Ridge, 4 April 1917. The dense network of German trenches in this sector was largely destroyed in the bombardment before the battle of Arras. By 9 April, the First Army found that there had been too much trench bombardment.

Source: Author's collection.

Messines Ridge

The next British attack was up the Messines Ridge. ([Map 15](#) shows the British attacks in the second half of 1917, while [Map 4](#) shows the Messines sector in excellent detail.) The infantry attacked on 7 June, about a month after the fighting at Arras died down, but the bombardment had begun a month earlier. The pause was necessary to perfect the artillery arrangements, mainly moving many of the guns north from Arras. There was enormous similarity in the planning at Messines Ridge and that at Vimy Ridge. Some of this was deliberate, with proven methods and plans being passed along informal networks as well as published via the SS pamphlets. For instance, Lieutenant Colonel A. F. Brooke passed Canadian Corps' voluminous and detailed counter-battery plans to X Corps, which was covering a flank at Messines.²⁴ Messines Ridge dominated the southern flank of the Ypres Salient and had been an obvious British objective since September 1914. The Germans had recognized the obvious and fortified it heavily. The BEF had decided to launch a set-piece attack. Nineteen mines, containing roughly a million pounds of high explosives, had been

excavated under the Ridge, taking over a year to prepare. Administrative and tactical plans had been started as well, although they could not be finalized until the forces available were known. ²⁵ The two corps in the sector had been in place for a very long time, and their thorough local knowledge gave the British artillery great advantages. Also, since each ridge, while opening the way for a larger offensive, was a limited attack in itself, the British had the tactical advantages of biting-and-holding. (Photo Essay 2 has a variety of photos about Messines.)



Map 15. Western Front, 1917, Battles of Messines, Third Ypres, Cambrai. This map shows some detail of the BEF's three main battles of the latter half of 1917.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

German artillery line. The Second Army insisted, "we must get those bally guns" behind the ridge, and plans were adjusted. ²⁸

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In all this Plumer had complete confidence in Franks, even to the point of allowing Franks to go on leave, returning only days before the attack. ²⁹ This may have been scheming on Plumer's part, for with Franks away he had an excuse to avoid changing the artillery plan according to the vicissitudes of GHQ. If Plumer was indeed anticipating interference, he was right, and it came at the last minute. ³⁰ There was no complaint with the nature of the bombardment (there could have been few, since it came straight from GHQ publications), but suddenly GHQ wanted to detonate the mines early, simply to improve the counter-battery effort. The new idea was to detonate the mines so that the Germans would think the infantry assault had begun and open fire with their concealed artillery. The British would then shell the newly revealed German guns. That Birch should ever conceive such a plan, and get Haig's approval, shows how important counter-battery fire had become vis-à-vis bombardments—the German infantry were far from the most important part of the defense. As we know, this bizarre plan was not implemented; the mines were saved for Zero Hour. The Second Army appeased GHQ's counter-battery mania by increasing still further the percentage of guns dedicated to counter-battery work and altering barrages. Birch still fussed about the details, lecturing the Second Army's chief of staff on how to conduct the counter-battery operations, but if the methods may have annoyed the Second Army, the results were excellent. ³¹

The BEF easily took Messines Ridge. The bombardment (including counter-battery work) had been extremely effective, and the mines obliterated or stunned the German infantry on the ridge. The initial objectives were easily taken, and reserve troops passed through to take the secondary objectives. Because a river flowed east of the ridge, the Germans could not easily mount a major counterattack, and wisely did not try to: any efforts would have been hampered by the river crossings, uphill and into the teeth of a formidable British artillery concentration. The British defensive barrage decimated local counterattacks. The worst problems with the British artillery were bad communications between forward observers, who misidentified friendly infantry as Germans and shelled their own men.

Third Ypres: Planning

Before the launch of the Third Battle of Ypres, as between Arras and Messines, there was a pause in British operations. Men and guns had to be moved, administrative and operational plans drafted. There was also the problem of taking over frontage from the French by the Fifth Army, and the coastal sector by XV Corps. All this had to be done from a standing start, since there were no plans ready on the shelf as there had been for Messines. ³² GHQ's plans were mostly strategic, emphasizing clearing the Belgian coast, rather than operational, which would have focused on taking the Gheluvelt Plateau, and nobody had carefully addressed the tactical problems. At a May conference at Fifth Army headquarters the bombardment's duration was not even on the agenda, and was only raised as a question from the floor. ³³

While Haig was keen to attack in Flanders, and had strategic reasons for doing so, he certainly

should have issued warning orders to start the planning process. Perhaps he was constrained in doing so by the lack of Cabinet support for the attack—the Cabinet were keen on the strategic objectives, but shied away from the anticipated losses. Moreover, the BEF had only recently emerged from the French control that Lloyd George had engineered at Boulogne, and planning may have been constrained by the French. Regardless of the reasons, there was a gap of seven weeks between Messines and the first infantry attack of the battle that would culminate at Passchendaele. Not all of this was devoted to building roads and training troops; there was time to digest some of the lessons from Messines. Plumer's staff provided the grist for two SS pamphlets; several others would come out in July or August 1917 distilling recent events for the rest of the BEF. ³⁴



Destroyed German concrete dugout, near Hill 60, 27 August 1917. This is what heavy artillery could do: a 9.2" shell destroyed a German dugout with two feet of concrete reinforcement that had been ten feet underground. However, it took a long time to destroy any substantial percentage of these defenses, and the Germans built many pillboxes.

Source: IWM photo E665.

The Germans did not waste the seven weeks either, using the time to build a large number of pillboxes around the Ypres Salient. These forced a further delay beyond the administrative delay, since the British infantry wanted most of the pillboxes destroyed before the attack. The BEF was in

an unfavorable geographical situation, overlooked and encircled, attacking uphill and out of a salient. The Germans had decided to fight on favorable ground rather than withdraw to a fresh line further east and thus delay the British attack by giving up a few miles of ground. The Germans reinforced their artillery, which meant the Royal Artillery needed over a month to gain the necessary counter-battery advantage. That Flanders was the chosen arena for the year's major British offensive, despite its unsuitability for artillery, is another reminder that the BEF placed strategy first, infantry and cavalry concerns second, and technical considerations only third. Senior artillerymen knew it was a bad place for the artillery, and commented on it freely, but did not seek to change matters.

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Eventually the British did win the counter-battery struggle, at a considerable cost in guns, gunners, and fatigue. The Germans adopted new counter-battery tactics optimized to the congested Ypres Salient. They did not try so much to destroy British units as to disrupt and disorganize. Harassing fire (often at night), interdiction of supplies, night bombing, gas, and firing at general areas rather than specific targets all served to fatigue and disorganize the British. The German objective was to delay the attack as much as possible, which worked fairly well. Judging by British memoirs and accounts, it was an effective policy, and very unpopular. Many heavy artillery batteries had already been through the Vimy/Arras and Messines battles, because there was not enough heavy artillery to allow much resting on the quieter portions of the front, and they were not fresh when they arrived in Flanders.

At the same time, the German positions were being bombarded. Under the circumstances there was never any doubt that the bombardment was going to attempt to destroy the bulk of the German defenses: topography favored the Germans to such an extent that any surviving artificial defenses could have meant an impregnable defensive line. Furthermore, both of the MGRAs involved, Charles Buckle of the Second Army and Herbert Uniacke of the Fifth Army, supported thorough bombardments. ³⁵ The bombardment was heavy, prolonged, and thorough to the extent that for weeks to come German barbed wire was no obstacle. ³⁶ Trenches were hardly a factor in Flanders, since the water table was so high, and the bombardment smashed the parapets the Germans had built up. Once these were broken up, the German infantry were fighting from shell holes, and could be dealt with by heavy barrages rather than a separate bombardment. The bombardment had much more trouble with the pillboxes. Most were sturdy enough to withstand anything except a direct hit, and some could survive even that, although the troops inside could still be shaken or even killed by overpressure. Pillboxes were enough of a problem that the BEF obtained a supply of armor-piercing ammunition so they could literally crack them open, even at the cost of firing enough shells to obtain direct hits. ³⁷

Third Ypres: The Battle

The Third Battle of Ypres famously did not go as planned, and later phases literally bogged down in mud that drowned men and horses. The first assault was on 31 July; it gained ground in unimportant sectors but was fiercely counter-attacked in key sectors, and the overall British gains were operationally unimportant. Throughout August the main effort was made by Hubert Gough's Fifth Army. Gough was well known as an aggressive "thrusting" general, and he tried to maintain a high tempo of operations. There were attacks every few days, not necessarily very large and

generally poorly prepared. Gough was trying to wring the last benefits out of the massive preliminary bombardment rather than treating his subsequent attacks as separate operations. Most of the attacks failed, some gaining no ground, others unimportant ground, and others being rebuffed by German counterattacks.



55th Siege Battery Royal Australian Garrison Artillery, Voormezele, 15 September 1917. The 9.2" howitzer was an excellent weapon with good range and shell power. However, it was not very mobile; the large box at the right was part of the weapon's frame that helped hold it in place. Every time the howitzer was moved it had to be emptied of around nine tons of earth, disassembled, moved, reassembled, and refilled. In 1918, the rough estimate was that these howitzers were of no use if the front moved more than 3,000 yards per day, as the time taken in moving the weapons far outweighed their time in action. These gunners, near the Ypres Salient, are presumably firing a night harassing mission. They are masked against German gas. Gas was commonly used at night because sleeping soldiers were more likely to breathe enough gas to incapacitate or kill them before they could be woken by an alarm. The British used the same logic as well.

Source: IWM photo E693.

In early September, Haig handed most of the responsibility to Plumer's Second Army, which started methodical preparation for the next attack, including heavier bombardments. Plumer

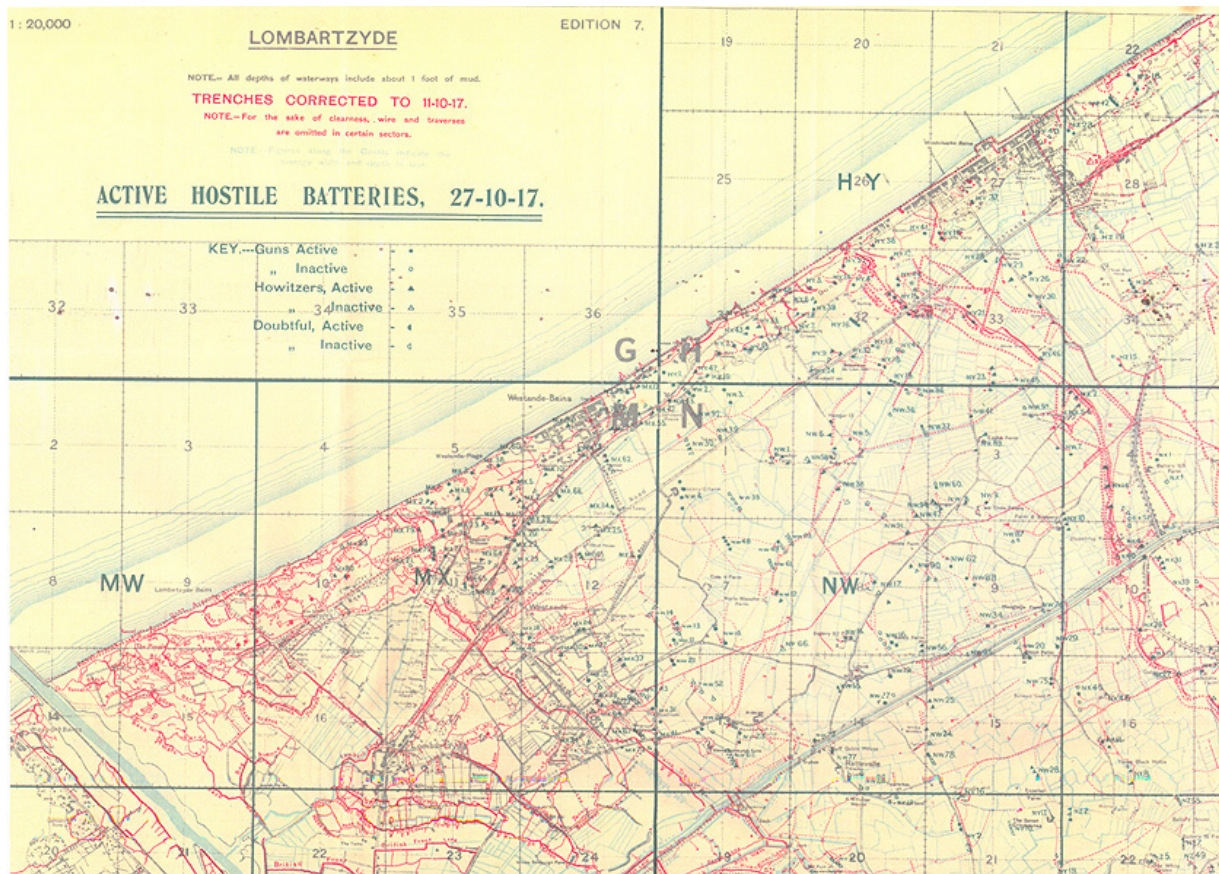
regained the counter-battery edge that had eroded in August when Gough switched the artillery to other targets, and Plumer also extensively bombarded the defenses. In large measure he did this by concentrating guns to a greater extent than previously; he simply had more material to work with, and he took his time to make sure things were done properly. ³⁸ He took about a week between each bite to build supply routes, rotate in fresh infantry, familiarize the troops with the ground, and bombard adequately. His operations tempo was slower than Gough's, but he was more successful. He gained ground, held his gains, and was chewing up the German reserves. The Germans tried various tactical changes to stop or throw back the British infantry, but only increased their own losses.



54th Siege Battery Royal Australian Garrison Artillery, near Ypres, 12 September 1917. These guns were deployed near the Ypres-Comines Canal, at the base of the Ypres Salient, which accounts for them not being dug in. Camouflage material is behind the men moving shells along the light railway, so presumably the netting was down for this bombardment mission. Some aspects of the amount of labor needed to ready an artillery position can be seen. Heavier weapons benefited more from light railways because they had heavier shells (200 pounds for these eight-inchers). Each of these howitzers has a substantial quantity of shells, and there were dozens of eight-inch howitzer batteries in the Ypres area. The platforms under each howitzer (to spread recoil and prevent the howitzer from sinking into the soft ground) had to be brought to the site and put in place; the planks could be six to eight inches thick. It took a substantial amount of time to build light railways, especially if the ground had to be stabilized before the rails could be laid. Plumer benefited from dry weather during his attacks in September 1917, which made the infantry's job easier but also improved his logistics situation.

Source: IWM photo E1918.

This was close to the bite-and-hold methods some officers supported, and even some GHQ planners supported bite-and-hold under these conditions. (See [Appendix 22](#) for an argument in favor of bite-and-hold.) Plumer was not quite so aggressive, attacking at weekly intervals rather than every two or three days as Gough had. ³⁹ Plumer probably was not overly influenced by the memos within GHQ (nor was he harking back to du Cane's March 1915 ideas), but neither was he alone. Haig also gave Plumer more latitude than he had given Gough in August; there was a dim realization that momentum had to be built up via a bombardment. Throughout the campaign (to call it a battle hardly does it justice), bombardments were excellently organized and planned, and they worked extremely well (always, of course, provided that enough time and guns were allowed). ([Appendix 24](#) has information on how bombardments were planned.) That the Royal Artillery was able to do so well in such an unfavorable sector as the Ypres Salient suggests that the same effort would have been even more successfully applied elsewhere. Plumer's successes brought pressure from Haig to increase the tempo of the advance, and Plumer yielded somewhat. However, another key to Plumer's success changed: the weather broke. Despite the muddy reputation of Flanders, September had been generally dry, and the Second Army had taken full advantage. The British attacks took longer to organize when guns, troops, and supplies had to negotiate muddy tracks.



Map 5. Coastal sector Active Hostile Batteries map, 27 October 1917. In the coastal sector, the Germans had the upper hand in terms of artillery. For an offensive to succeed, the British needed to destroy or neutralize the majority of artillery batteries shown on this map, and to do so quickly. The broader situation never warranted the attempt, and the BEF consciously chose not to try nibbling what it could not swallow in one bite.

Source: Author's collection

Smaller Operations

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The influence of artillery outside the main, politicized battles can be seen in two small operations beside Passchendaele. XV Corps had moved to the coastal sector to prepare a combined land-amphibious attack that was linked to the larger Flanders campaign. The Germans had the artillery edge in the sector, since they could use many of their super-heavy coastal guns. The corps calculated how many guns would be needed and the length of time required to win the counter-battery duel and to then bombard the German positions. ⁴⁰ (Map 5 shows the coastal sector and the German batteries.) They also recognized there was no point in stretching fewer guns over a longer period: the Germans would respond to a gradual campaign and would have the upper hand unless the British struck a sudden, decisive blow. Haig noted the operation was "an artillery problem" and examined the papers, but in a rather cursory way. ⁴¹ In the end the coastal attack was never made, but it provides a rare example of the chess-like artillery struggle, predictable several moves in advance, overruling an operation.

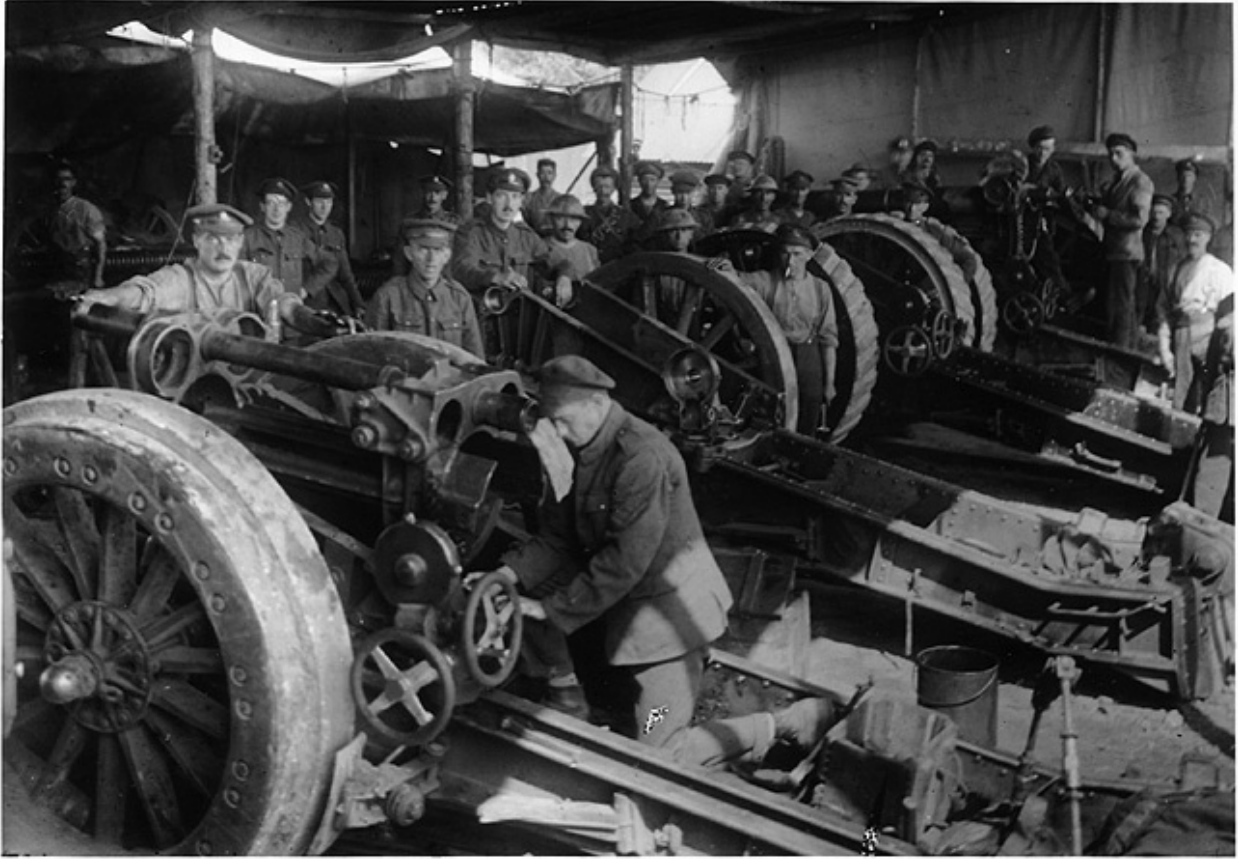


German counterattack around Hill 70. The Canadians exploited the fact that the ground around Hill 70 was quite open. Because they only launched a limited attack, they could use intense artillery fire to inflict heavy losses on German troops counterattacking across the open ground.

Source: IWM photo CO1757.

Another operation taking place during the Passchendaele campaign and largely driven by artillery was the Canadian Corps' battle outside Lens. Ordered to make a diversionary attack on Lens, Lieutenant-General Sir Arthur Currie (the corps commander) successfully argued to capture the dominating Hill 70 rather than plunge straight into the ruined city of Lens. His reasoning was that powerful artillery support would allow the hill to be taken more cheaply and retained at less cost than fighting in the rubble. GHQ approved his planning, and the results proved the method. The Canadians took the hill at a light cost and used concentrated artillery fire to inflict heavy losses on German counter-attacks. The attack was successful at both gaining ground and pinning down German reserves away from Flanders. However, the pattern could not be used everywhere: shells and guns were needed for Ypres. Moreover, the heavy firing caused the Canadians' guns to wear out quickly, and during 1917 the supply of replacement guns was low, so Birch said the attack had to stop lest the Canadian Corps ruin its own artillery. ⁴² Haig expressed a preference to continue the attack, but allowed Birch to overrule him, demonstrating where authority was—and was not—delegated. The battle also shows GHQ still having divergent attitudes towards limited attacks

(whether preliminary or diversionary) and major offensives. Technical considerations could be allowed to shape limited or secondary attacks, but major offensives would likely be driven beyond technical limits. Somehow, determination, willpower, and leadership (the traditional army qualities) would overcome the difficulties.



Repairing worn-out 60-pounder guns, Ordnance Workshop at Lovie, 22 August 1917. A major concern in 1917 was the wear that artillery pieces were suffering from firing thousands and thousands of rounds. Each round fired wears a tiny amount of the barrel away, and eventually muzzle velocity and accuracy decrease. Accuracy can decrease catastrophically if the wear is uneven. Because shell production had outstripped production of new guns, the wear problem was acute in 1917; by 1918 gun production had caught up. The problem of wear across the BEF's whole stock of artillery was so severe that it affected operational choices, because the BEF could not use large quantities of artillery to take limited objectives in attritional battles.

Source: IWM photo Q2769.

Cambrai

By the later stages of Passchendaele, the BEF was already planning another attack, one of a very different nature. The battle of Cambrai depended on two elements—tanks and a surprise artillery barrage—and dispensed with any preliminary bombardment. The genesis of the plan came from a relatively junior artillery officer. Brigadier-General Hugh Tudor was filling in when his superior was on leave, and took the opportunity to gain the ear of the Third Army commander, General Sir Julian Byng. Byng then took up the ideas himself. ⁴³ It only reinforces the artillery's subordinate role that R. St C. Lecky (the Third Army's MGRA) opposed the plan, but threw himself into it when over-ruled. ⁴⁴ Tanks and guns *combined* to make the attack possible; its reputation as the first tank battle takes too much advantage of hindsight.

The story of Cambrai has attracted significant attention, and only a few points will be emphasized, mostly contrasting it with Allenby's plans for a surprise attack earlier in 1917. ⁴⁵ (Appendix 26 shows some of the artillery planning.) Tanks provided a useful tactical boost, bringing firepower to bear on German positions in close support of the infantry. But more importantly, they restored operational surprise in a way very similar to the 106 fuze: the tanks reduced the time needed to breach the barbed wire barriers. At Cambrai, there were enough tanks to breach the wire over a substantial front (10,000 yards), avoiding the need for any preliminary bombardment. Another simultaneous technical advance in the artillery meant the guns did not have to register their targets, and thus there were no signs that the British were preparing an attack.

The whole attack was a surprise to the Germans, not just the timing of Zero Hour. Since they had no warning, the only German reserves in the area were there simply through luck (in contrast with Arras where the reserves were deliberately located there), and (unlike at Passchendaele) there was no reinforcement of the artillery. Allenby had wanted to minimize wire-cutting, but GHQ was reluctant to trust what looked like half-measures. Now that there was an ironclad guarantee of wire-cutting, Byng's plan was approved. The artillery also benefited from a technical revolution coming to fruition. Having struggled with an enormous learning process of teaching the new soldiers gunnery, and of everybody learning more advanced gunnery, by late 1917 all the pieces were in place. Guns could be calibrated behind the line, meaning they could move straight into position, and did not have to register, so they could fire accurately without revealing their presence. ⁴⁶ The differences were most appreciable to those furthest forward, who dealt with the details of gunnery on a daily basis. By mid-1917 some corps were exploiting the new technology, and by the end of the year it had percolated up to GHQ. It is not clear how many gunnery details were explained to Byng, Haig, and their General Staff officers, but it does not particularly matter: they grasped the essential point that a new artillery method that offered significant operational advantages was available, and they supported its use.

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In some regards this is remarkable. Earlier in 1917 GHQ had rejected a plan with strong traditional elements, but now was happy to adopt—and even expand upon—a plan that explicitly admitted that there would not be complete "preparation" of the German defenses. The time had arrived (as it had not earlier in the year) when the technical changes that had percolated throughout the BEF added up to a revolution, and Birch did not intervene as he had earlier. GHQ now trusted senior subordinates who had ideas of their own, a significant loosening of its centralized command style.

It is not simply that officers at GHQ were too busy overseeing the last days of Passchendaele; they were fully engaged in the planning of Cambrai, and Haig himself spent several days inspecting the divisions involved. ⁴⁷ Cambrai foreshadowed the battles of 1918 in many more ways than the presence of tanks and the absence of a bombardment. The Fifth Army's MGRA, Herbert Uniacke, came to nearly the same conclusion without having much experience with tanks: "If therefore we are ever going to pluck the fruits of victory, we must shell less lavishly or rather less *destructively*.
⁴⁸"

On 20 November the British attack began. It made good, if patchy, progress and the BEF learned new wrinkles about the coordination of advancing infantry, tanks, and artillery. But the Germans held onto a few key positions, and the value of surprise quickly dwindled. The British resorted to heavy, if quickly arranged, bombardments to gain ground, and the battle turned into a relatively ordinary slugging match for particular locations. On 30 November the Germans used their new storm-troop tactics of infiltration to launch a major counter-attack, which regained much of the ground they had lost. When the BEF examined the results of Cambrai for lessons about the future, the most obvious lessons were about liaison, mobile warfare, and defense—after all, there had been no preliminary bombardment.

Reviewing 1917

Through 1917 the BEF had fought several battles under a variety of conditions. Arras was supposed to be a preliminary attack, drawing German reserves away from a major French offensive. Vimy Ridge and Messines Ridge were both geographically limited attacks, taking the ridges but not exploiting any further. Third Ypres was a major offensive that had multiple stages and had the longest preliminary bombardment of the war. Cambrai had no preliminary bombardment at all. The strategic and operational goals may have changed, but the bottom line for the artillery did not change: the artillery was working to help the infantry.

Senior artillerymen were still not trying to change the supporting role of artillery. Herbert Uniacke, having commanded the Fifth Army's artillery through the year's battles and handled the planning of the battle of Arras, drew up his lessons for the year. ⁴⁹ His tactical notes alone stretched to twenty pages and give a great range of detailed comments on how the artillery could produce the most effective fire. But he never lost sight of the reason for producing that fire, his concluding sentence being

As the enemy changes ... his methods of defence ... so we must modify ... our methods of Artillery attack in order to break down that defence, allow our infantry to assault with a reasonable prospect of success, and gain their objective with the minimum of loss—*always bearing in mind that the final decisive factor is the bayonet of the Infantry soldier.* ⁵⁰
(Extracts of this report are available as [Appendix 27](#).)

Uniacke clearly sought the best way to orchestrate his guns, and knew that success was more than just seizing ground, it was in seizing it at the least cost. However, his ultimate purpose was unchanged: support the infantry as best he could.

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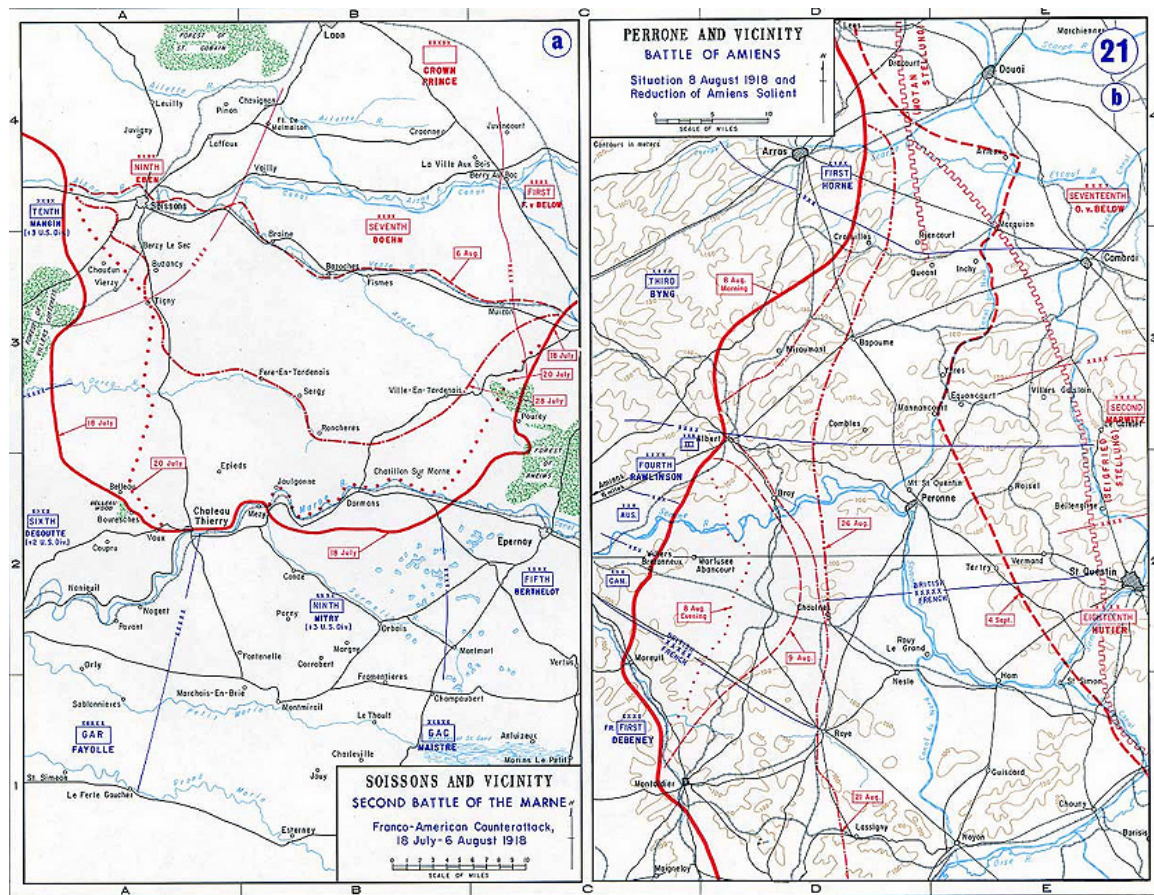
1918: Early Attacks

There were no British attacks in 1918 until the Germans wore themselves out; defensive tactics were the order of the day. But as soon as the Germans stopped, the BEF began attacking again. Initially the BEF launched only minor operations, improving a local situation with perhaps a battalion of men, but using plenty of artillery support to reduce casualties. ⁵¹ Sometimes tanks were employed, most notably at Hamel. ⁵² Hamel was in some ways unusual, but was in other ways typical of the small attacks. It used relatively small infantry forces (two brigades), had limited objectives, faced weak German defenses, used lavish artillery (more than at Hill 70 the previous year, which was a tougher objective) and air support, and was very successful. ⁵³ These were all typical features of the new brand of small attacks. The use of tanks (both in combat and supply-moving roles), and the involvement of American troops (which had been attached for training to the Australians) were not normal. Because of the tanks, the weak German defenses, and the overwhelming British artillery, the Allied forces quickly gained the objectives, took many prisoners, and suffered very few losses; the Germans did not even bother to try a counterattack, knowing their local reserves were not strong enough to face the compact, relatively fresh Australians. The lavish artillery support allowed the Australians to use less infantry in the attack, which led to lower Allied casualties. The artillery was also ample to both suppress the German artillery and (thanks to the weak German defenses) the German machine-gunners, which also kept Allied losses down.

were a rarity for these small attacks, but so were deliberate bombardments. Mostly this was because the German defenses were extremely weak; without strong defenses, there was little need for a bombardment. German defenses were weak because they had left the elaborate defensive positions they had built up over time and were instead holding wherever the offensives had chanced to run out of momentum. By moving into the open the Germans had, in a sense, opened themselves up to more effective Allied attacks.

As the German offensives grew smaller and less frequent, the BEF stepped up its minor attacks. The changing circumstances were obvious even at GHQ: bombardments were superfluous against light defenses that, thanks to the element of surprise, would be lightly held. The army commanders put a different spin on this at a June conference, noting that "Infantry ... must be trained to fight and manoeuvre under cover of artillery fire ... rather than to rely on the invariable support of a dense barrage." ⁵⁴ Attacks therefore went ahead under the cover of a barrage and counter-battery fire, more like a raid in ordinary trench warfare. Different local situations prompted different methods, part of the new, decentralized BEF. At Meteren, the 9th Division fired an identical bombardment against the German positions every day for two weeks, finally attacking on the fifteenth day. The German defenses had been obliterated, and the Germans had become so accustomed to being shelled without an infantry assault that when the attack came it had tactical surprise, and casualties were low. As a further indication of how flexible decision-making had become, the commander at Meteren was Hugh Tudor, who was partly responsible for the surprise attack at Cambrai. Wedded to neither bombardments nor surprise, Tudor tailored his plans to fit local circumstances. This flexibility also reiterates the evolutionary British tactics. Had there been a conscious revolution it would have swept away these "old fashioned" methods. As it was, there was no revolution, and

officers simply did what was necessary. At the same time, the artillery had become so sophisticated, so thoroughly trained, that individual guns were given tables that minutely recorded their tasks. ⁵⁵



Map 18. Battle of Amiens. This map shows the rapid initial progress of the Amiens attack, followed by the results of stiffening German resistance.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

1918: Amiens

The same flexibility was true in larger operations. Most of the details for the battle of Amiens were settled between the ANZAC Corps and the Fourth Army without involving GHQ. ⁵⁶ (Map 18 shows the Battle of Amiens.) The basic plan was to launch a major surprise attack, using good infantry (the Canadian and Australian Corps were assigned), every available tank, and plenty of artillery, but above all surprise. The German line outside Amiens was weak; the Germans were still hoping to launch one more attack and capture that city's major rail junction, so they had little incentive to fortify heavily. In addition, the units in the line were both of poor quality and below

strength. Tanks were important to the attack for two reasons. Not only did they provide mobile firepower in the attack but they also meant the artillery did not have to spend any time cutting the German barbed wire; the French First Army (attacking next to the British Fourth Army) did not have tanks, and thus needed a preliminary bombardment, although the commander was willing to risk quite a short one.

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So crucial was surprise to this attack that Rawlinson ordered, "Previous to Zero night no circumstance less than an actual [German] attack in force ... would justify ... disclosing [the] concentration of guns." ⁵⁷ Unusually for World War I, there was even a deception plan: the Canadian Corps was secretly moved from the Arras area to Amiens but left elements behind to pretend to be the whole Corps. Every soldier in the Fourth Army received a leaflet beginning with the words "KEEP YOUR MOUTH SHUT." The 1,450 guns available did not have to fire a bombardment, but still had plenty of responsibilities: counter-battery fire, interdiction of German rear areas, and a barrage. The opening day of the attack went off almost like clockwork. In most areas the objectives were gained, casualties were light, and prisoners were many. But mobile warfare was always difficult to organize, and over the next few days the Germans reinforced with men and guns while retreating to better defenses. Meanwhile, the Allied troops tired and straggled, supplies were slow coming up, tanks broke down, and the artillery was out of position. Momentum faded and the advance was halted after an argument between Haig and Rawlinson. Haig wanted Fourth Army to press ahead, albeit at a slower pace, but Rawlinson argued that fully supported surprise attacks were more effective. (A contemporary report is available as [Appendix 35](#).) They reached a compromise: the Fourth Army planned step-by-step attacks, with the necessary bombardments, but instead GHQ launched an attack by the Third Army, using surprise and setting bigger goals. In a display of strategic and operational flexibility, the Third Army's ongoing diversions (which had helped the Fourth Army achieve its surprise attack) were converted into the real attack, while the pause before their surprise attack was ironically covered by the Fourth Army's obvious preparations for deliberate attacks. In this case it was not the Third Army petitioning to attack, but GHQ deciding that a surprise attack on weak German defenses was a better choice than renewing even a strong, carefully prepared attack against strong defenses.

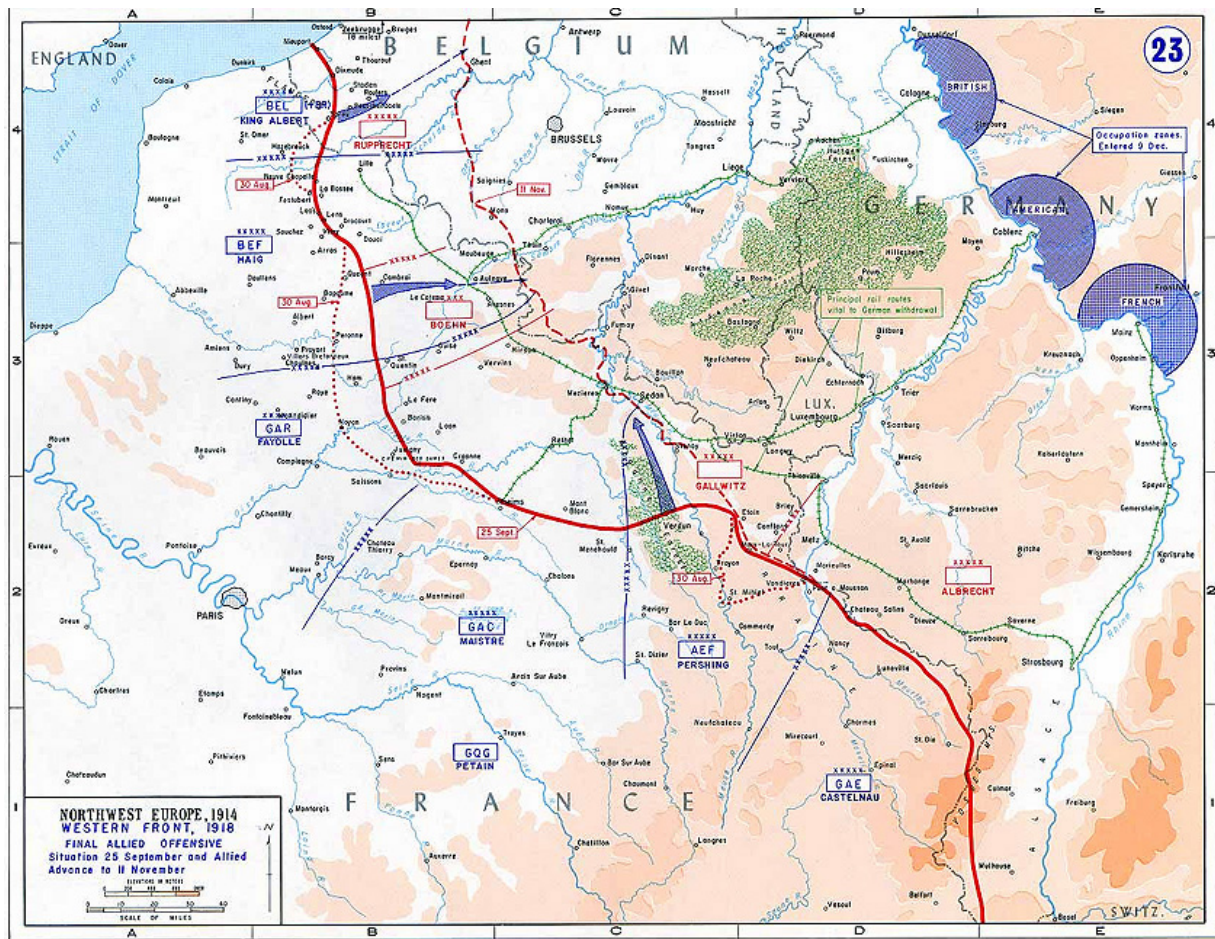
It is important to review why the BEF could now launch surprise attacks. Tanks played some role; where there was a high tank-to-infantry ratio, the tanks could create enough gaps in the barbed wire for the infantry to advance, freeing the guns to fire at other targets. However, the barbed wire was seldom a major obstacle at this point because the Germans had not had time to erect dense entanglements. "Silent registration," whereby the guns could be calibrated without having to fire ranging shots, was obviously important. It meant that guns could move into position and hit their targets without having to fire those ranging shots that would have revealed their presence. The sheer amount of artillery available was also important. The last artillery units formed in 1916 and 1917 had deployed to France and were in action. The German attacks in the spring of 1918 also raised the BEF's artillery-to-infantry ratio because, while a number of infantry brigades had been reduced to cadre strength and withdrawn from action, the artillery had taken much lighter losses and thus roughly the same number of guns were supporting fewer infantry. With enough artillery available, the BEF could pursue intense, smothering bombardments that deluged the German positions with great quantities of shells, achieving both destruction and neutralization at the same time.



Digging a gun emplacement, 21 August 1918. Even with the growing Allied superiorities in artillery and in the air that were apparent by mid-1918, it was still important to dig in. Camouflage was also important: the gun immediately behind the men, and the shells to the right rear, are under netting.

Source: IWM photo Q8238.

But the key change took place on the German side. The weak German defenses played a critical part. It took many fewer guns to achieve an adequate fire intensity against weak defenses, and the smaller number of guns (and their associated ammunition dumps) could be more readily concealed in woods and valleys. Making surprise a still more effective weapon, over the winter of 1917-18 the Germans had reorganized their infantry divisions. While some were upgraded to "assault" divisions, more were downgraded to "trench" divisions, with worse equipment and fewer of men, most of them either older or previously wounded. Thus the British surprise attacks hit not only weaker defenses but also weaker defenders. By the time the Germans had retreated back to their strong defenses (essentially the line where they had started their offensives), the accumulated defeats and losses had seriously undermined the morale of the survivors. Ludendorff and the Kaiser both had lost their nerve, and lost confidence in victory.



Map 10. Western Front, Allied offensives, 1918. This map shows the outlines of the Allied, including British, offensives in 1918.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>

1918: The Hundred Days

From Amiens to the Armistice, the Allied armies were constantly attacking the Germans and driving them back, switching the main effort when German resistance grew too strong in one area. (Map 10 shows the Allied offensives in summer-autumn 1918.) By 1918, this was the sort of decision GHQ was making, rather than the detailed operational and even tactical interventions of 1916 and 1917. It had finally become an Army Group headquarters rather than a body of officers looking over the shoulders of army and corps commanders. In short order all of the British armies were unleashed in surprise attacks, and all made substantial gains. GHQ became enamored of the surprise attack, at one point even encouraging the Fourth Army to try and "bounce" the strongest sector of the Hindenburg Line without either a preliminary bombardment or tank support. Rawlinson complained:

... The "Main Hindenburg System", of which the canal and tunnels form the basis of the defence, is very strong and cannot be captured without employing strong forces, with tanks and plenty of artillery, in accordance with a carefully prepared attack on a wide front. Even in the present demoralized state of the enemy there is little hope of rushing it. ⁵⁸

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His objections were accepted, showing a more balanced relationship between army commanders and GHQ. ⁵⁹ The artillery officers were still in the wings, advising. Rawlinson's senior artilleryman, Charles Budworth, had already noted that, "Although no preliminary bombardment preceded the [Hamel] attack on July 4th, it would be dangerous to assume that this is applicable generally to all future operations." ⁶⁰ This was probably not why Rawlinson balked at attacking the Hindenburg Line without a preparatory bombardment, but it certainly was a background factor, an opinion he could quote to support his views.



Barbed wire in front of the Hindenburg Line, near Bellicourt, 4 October 1918. This photo was taken six days after the British broke through the Hindenburg Line, and the depth and density of the belts of barbed wire is clear. The senior artillery officer in the sector noted that the artillery had not done enough against the barbed wire to clear the way for an attack, and if it had not been for the much lower morale of the German infantry the British would not have won the battle.

Source: IWM photo Q9382.

To breach the Hindenburg Line, the Fourth Army fired a four-day bombardment. There were neither enough guns (because the BEF had other operations underway) nor enough shells (because of logistical problems with the rapid pace of the Allied advance) to destroy all the German defenses. The artillery was concentrated on counter-battery fire, interdiction of German rear areas, destruction of key points (headquarters, observation posts, and the like), and only cutting gaps in the barbed wire rather than on complete removal. Despite a bombardment that observers later assessed as inadequate to even neutralize good German infantry, the British infantry broke through the Hindenburg Line. The German troops holding the line were not willing to fight hard enough to hold it; German morale, a chimera between 1915 and 1917, had finally broken. ⁶¹ Charles Budworth reflected afterwards on the success that the bombardment had against the Hindenburg Line, noting both that it was deadly for the Germans and life-preserving for the British infantry, continuing to show his appreciation that, however important and effective it might be, the artillery's purpose was to support the infantry. ⁶² (A contemporary report of the artillery operations is available as [Appendix 36](#).)

Haig also talked the Belgians out of a preliminary bombardment when they were planning to attack out of the Ypres Salient, a sure sign that conditions there had changed. ⁶³ Once the Hindenburg Line was penetrated, the Germans retired gradually, not standing to fight unless the British infantry had outpaced the artillery. There would be a pause in a given sector until the British artillery arrived in force, and frequently the constraint on the artillery was the logistic system that was relying on motor transport over bad roads and hastily repaired bridges. Once the guns and shells arrived at the front, there could be quite stiff fighting and heavy bombardments—probably the heaviest was at Valenciennes, just days before the Armistice. ⁶⁴ In their last major attack of the war, the Canadian Corps fired one 6-inch howitzer shell per 100 yards every 38 seconds, at times every 14 seconds; the lethal radius of such a shell was 500 yards, thus generating a theoretically completely lethal bombardment. Other heavy and field guns fired as well, theoretically killing the theoretically dead Germans again and again. Of course, not all the German soldiers were killed, but the bombardment was very successful in saving Canadian lives, albeit within limits. The deluge of shellfire allowed the Canadians to use less infantry, but casualties were still about one-third of the attacking infantry.

Conclusion

The means available, and methods used, to prepare for artillery attacks changed through the war. At first, no preparatory bombardment was envisaged, and then came purely theoretical ideas about using artillery to blast a way through the German defenses and restore "proper" warfare. These too had to be discarded due to a lack of guns and shells, but also because of doctrinal conflict. When, at Neuve Chapelle, attacks began in trench-warfare conditions, there was a germ of these ideas uneasily combined with pre-war ideas about morale and leadership. The result was bombardments that tried to remove obstacles to the infantry advance. After its partial success in the first attack, the BEF got confused. It tried to increase the amount of fire, but did not look as closely at what that fire was supposed to do. Thorough destruction in a short period was never possible until the late months of the war, when the Allies had large quantities of artillery and the Germans were in weak positions. Before then, Allied artillery was weaker and German defenses stronger; the best that could be hoped for was neutralization if the bombardment was short, or else a truly destructive bombardment had to be quite long. Bombardments should have been matched with the kind of

battle that was planned: a short bombardment should have been intense, which would have opened the way for a surprise attack. But barbed wire got in the way. It took days, even weeks to cut enough wire to satisfy the infantry, and the main bombardment had to operate in parallel with the wire-cutting. But either was enough to tip off the Germans and spoil chances of surprise. Since the infantry wanted, and probably needed, virtually total wire-cutting, there was no alternative, except to attack where the German defenses were lighter. That did not happen because strategy rather than tactics drove the Allies; offensive sectors were chosen for strategic reasons, not because of weak barbed wire.

Throughout 1916 and 1917 bombardments rose to such a pitch that they did destroy the German defensive organization, as well as front-line troops. But it took time, which the Germans used tactically to bring up reserves and thus forestall major British gains. The Germans also reorganized their defenses to at least try to avoid the heaviest parts of the bombardment. Defense in depth could be overcome by yet more artillery or more time, but either Allied adjustment gave the Germans at least some of what they sought. Both Allied options took some of the pressure off the Germans in terms of the number or tempo of Allied attacks. Eventually a combination of technical breakthroughs—one the tank, the other predicted artillery fire—allowed for surprise attacks, and the BEF (and Haig) wrung everything possible from its new operational opportunities. But it was not a revolution, and there was turning back. In 1918, when circumstances demanded a bombardment, it was done and often at an intensity previously unseen. Haig summed up the continuity of purpose in a letter to a former ADC: "...the arty [sic] methods employed [at Neuve Chapelle] were in front of anything which the French were then doing, and they also formed the basis on which our own artillery plans were based right up to the end of the war." ⁶⁵ The BEF's goal was to get its infantry into battle at an advantage, and artillery bombardments were intended to do that, not to be the major attacking element in themselves. While certainly using mammoth quantities of artillery support, the BEF rejected the "artillery conquers, infantry occupies" style of the French.

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The planning for an offensive gives a clear view of how an army intends to fight, and thus how it sees its strengths and weaknesses. Attacking forces generally have the initiative and can exploit their strengths and minimize their weaknesses. The British army gave lip service to inter-arm co-operation, but in reality everything else revolved around the infantry. (The quantity of support required also is silent evidence of how weak the British infantry was judged to be.) The artillery did not balk at playing a supporting role. They only argued that the infantry should pay attention to the other arms so that these could then provide the best possible support. An artillery staff officer later expressed this in the preface to an article: "Let it be granted ... the great ideal of 'gunners' is to support their infantry properly...." ⁶⁶ But co-operation was not what the planning system tended to produce, at least until the infantry and General Staff had learned a great deal about trench warfare. For a long time this left the artillery officers explaining what the guns could and could not do, then others deciding what the artillery should do. Artillerymen thought co-operation should actually go both ways, and eventually, about the time of Cambrai, everybody understood what co-operation meant. In 1918 the BEF fought with varying methods as conditions varied; the artillery were heeded about methods and operations plans. Throughout the war, with or without enough material, whether or not planners listened, the artillery did what it could to open the way for the combat arms.

Notes:

Note 1: Fourth Army, "Artillery Lessons Drawn from the Battle of the Somme," Montgomery-Massingberd Papers, file 7/4; Fifth Army's in WO158/344. [Back](#).

Note 2: E.g. SS114, "Care of Guns During Prolonged Bombardment," (March 1917); SS131, on Royal Flying Corps- Royal Artillery co-operation (December 1916); SS552 on Sound Ranging (March 1917). [Back](#).

Note 3: SS135, "Instructions for the Training of Divisions for Offensive Action," December 1916, which should be compared with the edition used for the 1916 campaign, SS109, "Training of Divisions for Offensive Operations." [Back](#).

Note 4: see G. C. Wynne *If Germany Attacks: the Battle of Depth in the West* (London, Faber & Faber, 1940) and Lupfer, op. cit. [Back](#).

Note 5: It was Allenby's own plan, supported only by his artillery adviser Major-General Arthur Holland: Field-Marshal Viscount Allenby of Megiddo and of Felixstowe Papers, 6/VII/7, LHC (hereafter Allenby Papers). At the conference Horne, Rawlinson, and Gough expressed doubts about a short, heavy bombardment. (WO158/223, OAD291/12, 2 January 1917) However, Horne soon submitted his own offensive plan, which embraced a short bombardment (WO158/40). Rawlinson had less to say, perhaps recalling his experiences the previous year. Plumer, who was not present, presented a plan for a short-bombardment attack up Aubers Ridge three days later (WO158/38). [Back](#).

Note 6: GS1/15 of 7 February 1917 (WO158/223), and Third Army war diary (WO95/363) of the same date. [Back](#).

Note 7: SGR61/7, 28 December 1916; OAD260, 2 January 1917; WO158/223. [Back](#).

Note 8: Haig Diary, 28 January 1917. Haig's moderate comments were: "He has certainly gone very carefully into all details, but I wish some of his calculations to be checked by GHQ." Anstey's proofs for his *History of the Royal Artillery* (140) say Birch "intervened and objected" on his own accord: E. C. Anstey Papers, RAI Military Document 1159 (henceforth Anstey proofs and Anstey Papers). Birch to Edmonds, 22 November 1937, and C. E. Vickery to Edmonds 14 February 1938, CAB45/116. Oddly, in discussing the weight of the bombardment, as opposed to the method, GHQ used figures long out of date, from June 1916 and even from Loos; Birch to Holland, 4 February 1917, Anstey Papers. [Back](#).

Note 9: Birch to Holland, 4 February 1917, Anstey Papers. [Back](#).

Note 10: OAD314, 12 February 1917, WO158/223. [Back](#).

Note 11: GS1/25 of 21 February 1917 and OAD314. One of GHQ's complaints had been about wear of gun barrels. The Third Army had already done tests, the results of which were unveiled and issued as an update of SS114, "Notes on the Care of Guns During Prolonged Bombardment" (editions of March 1917 and June 1916, which does not survive). See letter, R. H. Andrew to Archibald Wavell, 13 August 1937, in Allenby Papers, LHCMA, 6/7. With unconscious irony, Haig wrote to the War Office after the battle, praising the performance of artillery equipment: wear had not been excessive. WO95/58-60, GHQ Director of Ordnance Services diary, 2 May 1917. The Third Army had tested its plans to the extent of having VI Corps fire a 48-hour test bombardment in early January and then have the infantry patrol the German line to see its effects, which were apparently satisfactory: VI Corps CHA diary (WO95/784). [Back](#).

Note 12: Birch to Holland, 4 February 1917, Anstey Papers. [Back](#).

Note 13: WO158/223. This may have been a calculated double snub: I Corps held a very quiet stretch of front, where Holland would have little activity. Holland was livid at GHQ's obstinacy, at one point storming around the office and offering to stand on a chair with his head in a noose in the Grand Place of Arras, the chair to be removed when the first German shell hit the city. Allenby Papers, 6/VII/7. In 1916 Haig had thought highly of Holland; removing him was only a warning to Allenby. Kiggell to Robertson, 4 June 1916, General Sir Launcelot Kiggell Papers, 4/20 LHC. [Back](#).

Note 14: Birch to Edmonds, 22 November 1937, CAB45/116 shows Birch's inhibitions about ordering Holland. According to *King's Regulations* (§ 224(iii) and 225) Birch was right: he was technically junior to Holland. [Back](#).

Note 15: J. R. C. Charles(?) said that the GOC of XVII Corps doubted Allenby's plan: letter to Edmonds c. 14 July 1937, CAB45/116. See also letters from Cyril Falls to Archibald Wavell, 13 October 1938 and Charles Grant to Wavell, c. December 1938, both in Allenby Papers, LHCMA, 6/7. [Back](#).

Note 16: I consider that Allenby's plan stood a reasonable chance, at least before the German withdrawal to the Hindenburg Line provided more German reserves. For the contrary view see Jackson Hughes, *The Monstrous Anger of the Guns: The Development of British Artillery Tactics, 1914-1918* (PhD dissertation, University of Adelaide, 1992). [Back](#).

Note 17: SS139/4 §1 ¶3. [Back](#).

Note 18: Birch to Edmonds, 22 November 1937, CAB45/116 and CAB45/132. [Back](#).

Note 19: E.g. *OH 1918*, vol. 2, 365, as they toured various corps headquarters on 18 April. Birch and Haig stayed in touch after the war, Birch visiting Haig at least once. Letter from the present Earl (who listened to the conversations) to the author, 31 July 1998. [Back](#).

Note 20: Birch to Edmonds, 29 June 1938, and 8 July 1930, both CAB45/132. [Back](#).

Note 21: Horne (commander of the First Army) complained to Haig of too much shelling tearing

up the ground; Haig Diary, 12 April 1917. The First Army had more closely followed Birch's ideas on destruction than had the Third Army, so Birch's ideas were indeed more lavish than the infantry really needed. [Back](#).

Note 22: Allenby to Lady Allenby, 10 April 1917. Allenby Papers, LHCMA, 1/8/2. [Back](#).

Note 23: Something the First Army had depended on as a secret weapon; see Appendix 11 of *OH 1917*, vol. 1. See also Sanders Marble, "Secret Weapons in the British Artillery 1916-1917," *Military and Naval History Journal* 11, (April 2000): 43-51. [Back](#).

Note 24: H. W. Wynter, "The Revival of the Barrage," *JRA* 70:4 (1943): 273. SS 158 (Notes on Recent Operations...), 164 (Notes on the use of Tanks...), and 168 (Notes on the Employment of Serviceable Guns... captured...) were all published after Arras but in time for Messines. [Back](#).

Note 25: So detailed and complete was the planning that IX Corps' plans for operations, administration, and artillery were printed by the U. S. War Department as examples for fledgling U. S. staff officers. U. S. Army War College, eds., *Artillery Operations of the Ninth British Corps at Messines, June, 1917* (Washington, D.C: GPO, August 1917); *The Attack of the British 9th Corps at Messines Ridge* (Washington, DC: GPO, August 1917) [Back](#).

Note 26: Time available did not lessen the volume of paperwork, and Neil Fraser-Tytler wrote on 3 June 1917, "On my way back I called at Brigade Headquarters for tea and found them up to their necks in paper connected with the most ambitious and complicated Artillery Barrage that has ever been evolved by the British Army. On being bribed by the Colonel with a well-polished Dunhill pipe, I weakly promised to lend them for a few days my private Corona Typewriter to enable them to cope with this flood-tide of paperwork." N. Fraser-Tytler, *Field Guns in France: With a howitzer battery in the battles of the Somme, Arras, Messines & Passchendaele 1915-1918* (Brighton: Tom Donovan, 1995), 178. [Back](#).

Note 27: Birch to Harington (MGGS Second Army), 16 May 1917, *Anstey Papers*. GHQ did intervene, but only to increase on the number of heavies the Second Army requested. *Anstey galley proofs*, 160. [Back](#).

Note 28: Harington to Davidson, 11 May 1917, *Rawlins Papers*, file 12a/13. [Back](#).

Note 29: "Ubique," "Appreciation," *JRA* 87:1 (Spring 1960): 35-36. [Back](#).

Note 30: WO158/215, OAD458, 24 May 1917, and especially 29 and 30 May 1917. [Back](#).

Note 31: Letter, 27 May 1917, *Anstey Papers*. [Back](#).

Note 32: There was a rather feeble idea for a tank attack, devised in the winter, which seems to have sunk under its own weight. *Haig Diary*, 10 February 1917. The Second Army did some planning in January 1917, but no action was taken in the intervening months; WO158/38. Andrew

Wiest has examined matters closely in his Passchendaele and the Royal Navy (New York: Greenwood Press, 1995). [Back](#).

Note 33: *General Sir Ivor Maxse Papers, IWM, file 35/1, notes for conference, 23 May 1917. [Back](#).*

Note 34: *SS170, "... Co-operation between Aircraft and Artillery ... on the Second Army Front" (June 1917); SS172, "Preliminary Notes on Recent Operations ... Second Army" (July 1917); SS131 on RFC co-operation (August 1917); SS135, "... Training of Divisions for Offensive Action" (August 1917). [Back](#).*

Note 35: *Buckle had replaced George Franks on 7 July; Franks went to command the 35th Division. This was probably not a situation of Franks being removed for cause; he had been in his post for over eighteen months, and he had done little wrong. Franks may also have been tired: he did not command the 35th Division long, and went to a Home command when he left the division. More interesting was the promotion of Buckle: he was one of the first RGA officers to be a Corps BGRA (July 1916), and was the only RGA officer to be promoted to MGRA, finishing the war in that post with the Rhine Army. [Back](#).*

Note 36: *Robin Prior and Trevor Wilson, Passchendaele: The Untold Story, (New Haven: Yale University Press, 1996), 115, n. 10. It was a vast problem: for a front of 13,200 yards, the Second and Fifth Armies had to cut over two hundred linear miles of German barbed wire, much of which would be in considerable depth as well. WO158/38 [Back](#).*

Note 37: *MUN4/3377 and W. St C. Bland Papers (RAI Military Document 1126); Headlam to Minister of Munitions, 31 July 1917. [Back](#).*

Note 38: *OH 1917, vol. 2, 239 credits twice the weight of shell in half the area as before 31 July. [Back](#).*

Note 39: *Memorandum, Davidson to CGS (Kiggell) 26 June 1917, WO158/20. [Back](#).*

Note 40: *WO158/239, Fourth Army Operations files, August 1917. [Back](#).*

Note 41: *Haig Diary, 11 June 1917; WO158/239, with Haig's marginal notes. [Back](#).*

Note 42: *Haig Diary, 5 July 1917 and 2 September 1917; Rawlins, History, 269. [Back](#).*

Note 43: *Sir Hugh Tudor Diary, RAI Military Document 1167, July 1917. J. P. Harris, Men, Ideas and Tanks: British military thought and armoured forces, 1903-1939 (Manchester: Manchester University Press, 1995), 108-113, traces responsibility for the idea, quashing Tank Corps claims and elevating the role of Byng, the army commander. [Back](#).*

Note 44: *Sir B. Brooke, 15 May 1945, CAB45/118. Presumably Lecky remembered his predecessor's fate the last time the Third Army tried something new with artillery. Or the reports of*

him as dim may have been true, e.g. C. E. Vickery, 14 February 1938, CAB45/116. [Back.](#)

Note 45: The artillery Instructions are printed as Appendices 6A, B, and C in OH 1917, vol. 3. [Back.](#)

Note 46: This is another triumph of the SS pamphlets, for there was no official contact between B. R. Kirwan, who had devised screen calibration, and Tudor, who turned the technology into tactics. See E. A. James Papers, IWM, for movements by the 9th Division; Tudor's diary shows that he learned of screen calibration on November 16, 1917, months after submitting his plan. [Back.](#)

Note 47: Haig visited Third Army divisions from 12 through 15 November, and attended a conference of the Corps Commanders on the 16th. Haig Diary, 12-16 November 1917. [Back.](#)

Note 48: Uniacke Papers RAI, VII/2, "Lessons from the 1917 Battle Fighting of the Fifth Army from an Artillery Point of View." [Back.](#)

Note 49: Ibid. [Back.](#)

Note 50: Emphasis in original. [Back.](#)

Note 51: Haig noted about a dozen minor British attacks, or German withdrawals, between July and September. This is an imperfect index but suggests how much more fluid the Western Front was in 1918 than previously. Haig Diary, July-September 1918. [Back.](#)

Note 52: Hamel was so successful that it was written up in detail in a "Note on Recent Operations" and also as SS218 ("Operations by the Australian Corps against Hamel, Bois de Hamel, and Bois de Vaire, 4th of July 1918," July 1918). Haig Diary, 4 July 1918. Although an operation involving less than a division of infantry, Haig and Birch had visited corps headquarters to observe preparations. Haig Diary, 1 July 1918. [Back.](#)

Note 53: For a brief but very lucid overview, see Prior and Wilson, *Command on the Western Front*, 295-300. [Back.](#)

Note 54: OAD291/33/1, 11 June 1918 in Haig Diary. Birch had drafted a memo two days earlier that made exactly the same points; it is available as [Appendix 42](#). Rawlins papers, file 11. [Back.](#)

Note 55: Army Form W3981, "Barrage Table for No_ Gun," J. Batten Papers, RAI Military Document 1348. [Back.](#)

Note 56: Rawlinson Diary, 21 July 1918. The operations of Rawlinson's Fourth Army, which fought at Amiens and then broke the Hindenburg Line, are well covered in Prior and Wilson, *Command on the Western Front*, 301-391. Their interpretation and mine differ in places. [Back.](#)

Note 57: Letter 32(G), Fourth Army Papers, vol. 49. [Back.](#)

Note 58: Letter 265(G), 11 September 1918, Montgomery-Massingberd Papers, LHCMA, file

7/26/1. [Back.](#)

Note 59: *However, he did have to repeat himself before GHQ would agree: letter 270(G), 19 September 1918, Fourth Army Papers, vol. 49. [Back.](#)*

Note 60: *Rawlinson Papers, "Remarks on Artillery Action based on the operations of July 4th 1918." [Back.](#)*

Note 61: *Birch to Edmonds, 8 July 1930, CAB45/132. [Back.](#)*

Note 62: *Fourth Army Artillery in the Attack on the Hindenburg Line, 29 September 1918, Fourth Army Ops. Papers, vol. 52. [Back.](#)*

Note 63: *Haig Diary, 18 September 1918. Oddly, the previous year Tudor had wanted to attack the Menin Road Ridge without a bombardment: Diary, 26 September 1917. [Back.](#)*

Note 64: *For full details see A. G. L. McNaughton "The Capture of Valenciennes: A Study in Co-ordination," Canadian Defence Quarterly 10:3 (April 1933): 279-94. [Back.](#)*

Note 65: *Haig to Boraston, 24 June 1926, Colonel J. H. Boraston Papers, IWM. [Back.](#)*

Note 66: *"F. W. ", "Artillery and the General Staff," Journal of the Royal United Services Institute 64:455 (August 1919): 470-77. [Appendix 38](#) contains the entire article. [Back.](#)*

5. The 'Counter Blaster' and Counter-Battery Work

1

Introduction

Before the war, the British army virtually ignored firing at enemy artillery. *Field Artillery Training* had only seven paragraphs on the topic, and *Field Service Regulations* none.¹ The artillery's main objective was not mastering the enemy's batteries, but aiding the infantry in building up fire superiority over the whole of the enemy's forces to permit "the climax of the infantry attack." This might involve shelling enemy guns, but such a gun duel was secondary in the battle as a whole. Since the artillery's role might be firing at enemy infantry or guns according to the broader tactical needs of the battle, the artillery was only responsible for the technical details of its work; others would choose the targets, and the artillery had only to hit them. Throughout the war the effort devoted to suppressing the German artillery fluctuated, but it fluctuated according to the perceived needs of the attacking troops, not the artillery's wishes. In the first two years of the war scarce resources meant the artillery could only rarely perform any task satisfactorily, and counter-battery (CB) work was largely an afterthought. After the Somme battles displayed the tremendous artillery power on both sides, a new system delegated counter-battery work solely to the artillery. But this was only a delegated responsibility: while counter-battery work was handled by the artillery, it was done within parameters set by others, typically the General Staff in coordination with the corps or army commander. Eventually, however, everyone associated with the war effort saw how vital mastering the German artillery was, and extraordinary efforts were made. Gunners constantly sought new counter-battery methods, and when these came to fruition the rest of the army could change their tactics.

Pre-war Conditions

The experiences of the Boer War led to the pre-war lack of emphasis on counter-battery work. The British had tried 'artillery duels' against the Boers, and had encountered serious problems. The Boers protected their guns well, typically digging well-concealed positions for individual artillery pieces. This had a two-fold effect on the British: first, it was hard to spot the Boer guns; second, it was hard to damage them with the small numbers of shells available. The Royal Artillery ended up spraying the *kopjes* of South Africa with shrapnel in an attempt to suppress the Boer artillery rather than destroy it. On the other hand, the Boer artillery posed little threat to British infantry. The Boers had very few guns, and dispersing them made it hard to concentrate their fire. The result was essentially only harassing fire. Long-range fire certainly annoyed British infantry and cavalry, but the very small results unfortunately led them to underestimate artillery's potential. They had been extremely sensitive at the start, even to slow fire from single guns, but rapidly became desensitized because experience showed that they suffered very light losses from shellfire. After the Boers' defeat, the idea of the artillery duel died. It had, after all, been proved not only ineffective but unnecessary. There was no foreseeable need for an artillery duel in colonial warfare; the Boers were as technologically advanced as any small country, and if it were superfluous against the Boers it would be superfluous elsewhere too. More seriously, it was also dropped for European warfare. While the pre-Boer War ideas had harked back to the massed batteries of the Franco-Prussian War, the post-Boer War doctrine took the simplistic

view that the British would always have some superiority in artillery against a European foe. As one participant bitterly noted after 1918, "The occasional mutual contest of field batteries was all that was foreseen by our pre-war manuals." ²

If the doctrine had flaws right from the start, the tactical methods of executing it would shortly be obsolete. Most enemy batteries were expected to be in the open, or at least only partly concealed; these were to be shelled "till [their] fire is mastered." ³ Neutralization was explicitly the goal, with the implicit assumption that the advancing British infantry would capture the silenced enemy guns. Destruction was vaguely considered possible, but neither critical nor likely. Heavy artillery would be needed if enemy guns were dug in, but the main target (even in a siege) was still enemy personnel; destruction and neutralization were thus confused. Part of this was the British army's obsession with shrapnel, which could kill gunners but would rarely damage guns. A bigger problem was the conceptual fog surrounding the form of future battles. In a one-day battle, a gun with its crew killed was indeed knocked out, but in a month-long battle minor damage could easily be repaired and new gunners assigned. Since several battles in South Africa had lasted over a week, as had battles in Manchuria and the Balkan Wars, the British army was ignoring the evidence. The bottom line was that enemy guns were not viewed as targets, and nobody had thought about destroying gun emplacements. Even during sieges, the artillery was ignored and the enemy infantry was targeted instead. ⁴

These ideas were hardly revised in the light of the Russo-Japanese war, where artillery had been withdrawn from direct-fire positions. The two sentences in the pre-war artillery manuals that suggested shelling enemy observation positions presumably solved the problem of concealed guns.

1914: Experience from Battle

In 1914 these relatively simple methods worked as long as the Germans put their batteries in the open. At N ry, 'L' Battery RHA won immortal fame and three Victoria Crosses by blasting a German battery at point-blank range. It helped that both sides deployed at night and did not know about the other, but this was hardly going to be true for the rest of the war. At Le Cateau the British were not the only ones to deploy their batteries in open positions, and German batteries were shelled until the British guns changed targets to help their own infantry. ⁵ Even though the German guns were in plain sight, two other British preconceptions were proven faulty: the Germans not only had more guns, but the British fire failed to silence them. But these were the exceptions, and the British soon found themselves having to deal with German artillery deployed out of sight.

The terrain in the Aisne region revealed further problems. ⁶ Because British weapons had been optimized to fire shrapnel, they generally had flat trajectories. With the deep, narrow valleys of the region, the British guns had to deploy on the narrow hilltops because they could not fire out of the valleys. The shortage of communications equipment meant the batteries had to deploy close behind the front line; the limited range that the British had accepted as part of optimizing the artillery to fire shrapnel also necessitated forward positions. But the Germans held the higher ground and their observers could see British batteries and direct effective fire. The Germans had

some of the same problems, especially with the terrain, but they had a higher percentage of high-trajectory howitzers that could deploy in the valleys, out of sight of Allied observers.

Since the 18-pounders were so vulnerable to German counter-fire, the British response was limited. Only the longer-ranged 60-pounders were of much use; at one point Sir John French personally organized all the 60-pounders to engage German batteries in rotation, and Haig several times personally organized counter-battery fire. ⁷ The RFC helped spot batteries, marking locations on a gridded map for later shelling. The pilot would scribble on his map, circle back behind friendly lines and drop it, hopefully near a headquarters. Choosing which German battery to hit first was the first serious command decision entrusted to divisional CRAs.

During most of the autumn and early winter the Royal Artillery was simply too busy directly supporting the infantry to pay much attention to counter-battery work. Counter-battery fire would have been helpful, but other things were more critical. In the advance to Ypres, the artillery was usually divided into penny-packets, working up with the infantry—even single guns were pushed forward to boost infantry firepower. Since infantry lacked the firepower to deal with defensive machine-guns, the attackers needed artillery to even the odds, and while defensive artillery fire posed a problem, it was less urgent than destroying or suppressing machine-guns. Most divisions formed infantry brigade-groups (an infantry brigade, an 18-pounder brigade, and engineer and signal elements); these were technically temporary, but "the battle was mainly fought in these groups." ⁸ With field artillery parceled out, central commanders had only the 60-pounders and field howitzers; once heavy artillery arrived it was too precious for secondary missions like counter-battery fire. Once the fighting at Ypres died down, batteries pulled back a bit and better communications made it easier to concentrate fire. ⁹ Communications were vital for concentration and centralization, and calls went out swiftly for improvements. General Smith-Dorrien in November 1914 urged more signallers for the artillery because German "artillery fire has been more concentrated and more flexible," and he wanted the same advantages. ¹⁰

At this time there was a feeling that, since it was not directly supporting the infantry, CB was a lesser form of artillery fire. In addition, counter-battery work was somehow 'defensive' (it did, after all, react to the enemy) and therefore inferior. The BEF hoped to regain the initiative and free its artillery from merely neutralizing German guns. ¹¹ This is a reminder to us that counter-battery fire in this period was simply retaliation to make Germans cease firing, not an attempt to aggressively destroy guns. Combined with the desperate shortage of shells, there was virtually no counter-battery fire—at one point most counter-battery work in the Ypres area was assigned to the three guns of an armored train—but this was only a response to the pressures of the situation. ¹² It would not have benefited the BEF, or the Allied cause, if the Royal Artillery had been focusing its resources on a counter-battery fight and left the infantry unsupported when the line was broken. Artillerymen realized there was no point in a gun duel that did not help win the battle; if the pre-war idea was wrong in its outline and details, at least the objective was correct. Under the circumstances, infantry support was the critical task, and thus it was the artillery's top priority.

Since there was hardly any artillery to spare, there was no pressing need for a command and control system. A CRA was responsible to his division commander for artillery matters within the division (and by extension within the divisional sector), and he handled them unless they were devolved to brigade-groups. But counter-battery fire was substantially divorced from the divisions, although not formally. The heavy batteries were rapidly split off from their divisions. Some fell under corps command, while armies grabbed the rest. For instance, the heavy battery of the 1st Canadian Division wandered among ten different corps for over a year, and the 2nd Canadian Division lost its battery for a similar period. ¹³ Demand was so high that many heavy batteries from the newly forming Kitchener Armies went abroad ahead of 'their' divisions. ¹⁴ Because the existence of the brigade-groups had led to a mental association of the 18-pounders with infantry support, and with the 60-pounders taken away, the CRAs had few assets for counter-battery fire. Moreover, depending on local arrangements, they might not have the responsibility.

The winter of 1914-15 was generally quiet, with both sides learning about trench life and hoarding shells. Each felt the other had the upper hand. During the winter all heavy artillery (everything manned by the RGA) were consolidated, at least on paper, into "Army Artillery." ¹⁵ Armies did not command this directly, but formed Heavy Artillery Reserve Groups under brigadier-generals. ¹⁶ Often heavy artillery was not even commanded by the HARG, but was turned over to the corps, and since there was no subordinate headquarters in the corps to cope with the added responsibility, they might hand the artillery over to the divisions. The result was organizational chaos, with guns split four ways without rhyme or reason.

Early in 1915 armies controlled counter-battery work, and held on to some guns, but this did not last long. The system eventually shook down so that armies were equipped with the heaviest artillery, the corps with medium howitzers, and the divisions were assigned medium guns, the main counter-battery weapons of the period. ¹⁷ Thus the divisions resumed command of 60-pounders, but probably not the battery they had previously commanded. Moreover, new batteries were arriving, and units were being moved around as operations required, so there was only limited cohesion. At least some divisions started offices to control the counter-battery effort, but the shuffling of responsibility, the movement to-and-fro of batteries, and the shortages (of shells, guns, and staff officers) meant that efficiency stayed low. ¹⁸

Counter-battery work was still not a high priority, largely because the German artillery was also short of shells and was thus not producing much firepower; since enemy machine-guns were not short of ammunition, the British focused on those. (One example of the Royal Artillery's situation was the battery that was allotted thirty-two shells per day to keep thirty-five German batteries silent.) ¹⁹ Direct support of the infantry was still a higher priority. In ordinary trench warfare, if the German guns were active the British would "retaliate" against some sector judged to be "tender." Because the British counter-battery effort had been so weak, the Germans still had a good number of batteries deployed forward, even in sight of the British front line. If those batteries fired, then neutralization could indeed be directed at the 'offenders.' Also, the Germans usually posted batteries near villages, so the village could be bombarded to express British disapproval. This forward deployment of German artillery was a sign of Allied counter-battery impotence, and the Germans pulled back when their casualties mounted. Once the German

batteries withdrew from sight, British options dwindled basically to one. Since the offending battery could seldom be directly identified, the only option was to shell something that annoyed the Germans as much as the German shelling annoyed the British. This points out the weakness of artillery intelligence sources in the period, which were restricted to direct ground observation, pilot's eyeballs, primitive aerial cameras, and artillery officers cupping their ears.

1915: Shortage of Materiel

Even when the BEF attacked, counter-battery work was a lower priority than bombarding German trenches. The first significant British trench warfare attack was at Neuve Chapelle, towards the Aubers Ridge, from 10 to 12 March 1915. There were several important firsts, but a heavy counter-battery effort was not one of them. The key element of the German defenses was the infantry, firing rifles and especially machine-guns; their artillery helped in the defense, but was not decisive. As long as the main strength of the defense was the frontline infantry, they would be the Royal Artillery's main targets. ²⁰ Moreover, the few German batteries in the area were already known. At best they were in only semi-covered positions, and the British could identify their positions when they fired. Under these circumstances most British medium guns shelled the German communications routes instead of the German artillery. Not only was it very important to delay the arrival of German infantry reserves, but when the German guns did fire they could be quickly identified and targeted. Only two batteries of 4.7-inch guns were assigned to counter-battery fire, and for one it was a secondary task. ²¹ Yet in a foretaste of how changing German tactics would force British responses, the Germans reinforced their artillery around Neuve Chapelle, and by 12 March all but seven of the British heavy pieces were allotted to counter-battery fire. ²² Partly this was due to the changed circumstances of the battle—since the British infantry was no longer attacking, the German infantry was no longer the main enemy. The machine-guns that had been so deadly had no targets, while the German artillery was a real threat (especially since the Germans might counterattack, in which case their artillery would play a vital role).

The British repeated the attack up Aubers Ridge in early May. This time there was a counter-battery program, involving several batteries. Since there was not any more artillery available at Aubers Ridge than at Neuve Chapelle, using more of it for CB shows its growing importance. In a new wrinkle, a 60-pounder battery was assigned to work with an airplane that would watch for any previously undetected German batteries. ²³ Despite the new methods, better plans, and larger share of the resources, the counter-battery effort at Aubers Ridge fell short of what was needed, and the promising steps were not followed up. Festubert similarly brought no lasting improvements in counter-battery work.

By the end of May, the BEF was at least partially moving away from its retaliation / neutralization counter-battery policy. Now when preparing for an attack the goal was to destroy German guns, but this was desirable for its "morale effect." ²⁴ Presumably the British infantry would be somewhat encouraged, and the German infantry somewhat discouraged, but this reveals that the stated reason for reducing enemy firepower was not saving lives but improving morale. Whatever the reasons given, in mid-1915 the shell shortage meant that the necessary shells simply did not exist. It is also important to note one other part of the new doctrine:

destructive fire would be used before an attack, when there was time to adjust fire; during an attack, when the infantry needed enemy fire suppressed, the counter-battery guns shifted to neutralizing fire. This was a solid two-part plan and would be the basis of future counter-battery doctrine.

Counter-battery work was not yet a high priority, however, because there were more important things to worry about. Through 1915 the Germans were improving their defenses, first digging sturdier trenches, then digging them in greater numbers. Machine-guns, the backbone of the German defense during the British infantry assault, were getting harder and harder to hit. But the Germans had the same industrial bottlenecks the British did and were not expanding their artillery at the rate they were producing more machine-guns. The machine-guns had to be overcome, or infantry attacks were doomed, while German artillery was less certain to cause problems. Between attacks in trench warfare it was possible to identify German batteries and accumulate enough shells to hurt them. But for an attack, when every shell was desperately needed for bombarding trenches, CB took a back seat. Under these conditions there was little prospect of destroying German artillery, nor were there shells enough even to make a methodical attempt. Instead, orders were issued merely to respond to German fire. Even during the battle of Loos in late September, I Corps told its gunners "be prepared to reply" if the Germans opened fire. ²⁵ This may have been all that was possible, but it was still woefully inadequate.

Throughout 1915 the BEF was trying to deduce what the proper method for countering German batteries should be, but everyone recognized that the answer (whatever it was) could not be used until more materiel was available. ²⁶ There was progress in identifying guiding principles, but there was no linkage to actual operations. At Loos, IV Corps made no efforts to arrange counter-battery work, nor did it encourage divisions to do so. ²⁷ After that battle more attention was paid to counter-battery work, guns were earmarked for it, armies started keeping "Active Hostile Battery" lists, and daily reports began. ²⁸ The problem had finally become important enough to earn attention. Although the Germans had not reinforced much before the British attack (they thought the British bombardment was so light it was only a feint ²⁹), because operations on the Eastern Front had gone well they had plenty of forces to respond once they found the BEF really was attacking. The German artillery only suffered "very slightly," and more artillery arrived on the second day of the battle. ³⁰ While rifle and machine-gun fire was enough to stop most British attacks, the growing strength of the German artillery and the stagnation of the front after the initial attacks, which made artillery more important than infantry, focused British attention on counter-battery fire. One bad habit continued, that of using only medium guns (the 60-pounders and old 4.7-inch guns) for CB. The BEF had drifted into this since, without any chance of destroying their guns, neutralizing German gunners with shrapnel was the most efficient solution, and only medium guns had the requisite range. The habit evolved in 1916 into earmarking solely medium guns for CB (although enough howitzers became available to allow destructive fire), forgetting the original conditions that had caused the policy.

1916: Grappling with Organization

Conditions changed in 1916, namely in that the British had both more shells and guns and new command arrangements. Most importantly, however, new German tactics forced new answers.

Bombardment was still the Royal Artillery's main job, with counter-battery work coming in far down the list. Attacks might be defined by the available artillery—100 yards of front per heavy howitzer—but counter-battery requirements were not mentioned. From February on there was a new command system at the corps level that should have centralized counter-battery control there, but the brand-new system was untried. Responsibility was still divided between corps and divisions, with II Corps for instance leaving retaliation to divisions but taking charge of planned destructive shoots itself. Alternatively, when covering a raid, the division might control the counter-battery effort as well, since they better understood the local situation. ³¹

In the seven-day bombardment before 1 July when the Somme offensive began there was little counter-battery work. Counter-battery fire was the third priority, behind harassing fire and wire-cutting, indicating a return to the priorities of mid-1915 rather than learning from the later stages of Loos. ³² Although the preparatory bombardment was lengthened due to bad weather, the extra effort was put into bombarding trenches, not German artillery. Each corps in the Fourth Army decided how it wanted to conduct counter-battery fire, which inevitably produced significant variations. Some paid hardly any attention to the subject, being quite busy enough bombarding enemy defenses, cutting barbed wire, interdicting communications, firing feint barrages, and planning infantry support. Since the British plan was to break through rather than capture a portion of the German line, the entire depth of the German position had to be bombarded, which increased the number of targets, which then increased the priority of trench bombardment still higher.

For those corps that did make a significant counter-battery effort, the main goal was neutralization, often by retaliation. ³³ This would kill German gunners and might damage guns, but with the few resources available nobody expected much destruction. (This was a half-step back from the principles laid down in 1915, which shows they had not been entirely accepted. Before the Somme, there would be destructive counter-battery fire only during ordinary trench warfare, but during both the preliminary bombardment and the actual attack the goal was neutralization.) Planners realized that the counter-battery resources were still inadequate for sufficient destruction before Z Day, which forced a decision on how best to reduce the effectiveness of the surviving German guns. Some corps thought it was best to force German batteries to move to secondary positions because confusion, disorganization, and supply problems would reduce their effectiveness. Other corps thought it better that the BEF know where the German guns were located so that neutralization could be ready for Z Day. X and XIII Corps had clever plans to fire on German howitzers (which were most dangerous to infantry in trenches) before Zero Hour and neutralize field guns (the bigger threat to troops in the open) as the infantry advanced, while VII Corps had exactly the opposite idea. ³⁴ Also, some gas would be used for neutralization on Z Day since wearing gasmasks would significantly hinder German gunners, thus reducing their rate of fire and therefore their effectiveness. This was not the cloud gas (released from cylinders in the British front line) that had been so disappointing at Loos. Now a limited supply of gas shells was available, some from the French (who gave the shells and lent some 75s) and some for the British 4.5-inch howitzer. Using the field howitzer was a limited step away from the previous situation in which only medium guns were used for counter-battery fire.

Over the course of the four and one-half months of the Somme campaign, the need for effective counter-battery fire, both destructive and neutralizing, grew. The German defensive barrage was not the biggest problem on 1 July, but later in the Somme campaign, once the British artillery pulverized physical defenses, the Germans relied more on their artillery in defense. They also bombarded before counterattacks, much as the British bombarded before attacks, so in order to hold captured ground the British had to control the German artillery. Counter-battery priority rose dramatically. It became typical for neutralizing CB to begin at Zero Hour or even slightly before, although some corps in the Fifth Army took the bolder step of waiting perhaps three minutes after Zero and neutralizing only those German batteries that opened fire. This had the benefits of not wasting British shells, catching the German gunners in the open at their guns, and disguising whether the barrage on the German front lines signaled an assault. ³⁵ This approach it was soon dropped, however, because it gave the Germans the first few minutes to blast the British infantry; the idea was just too risky to be widely adopted.

Destructive CB was also done during the campaign, but in the lulls while the infantry regrouped. Since the intelligence organization could not pinpoint German batteries fast enough, success was limited, especially since German batteries tended to move rather than be annihilated. This could actually cause more problems than it solved if the new German positions were unknown at the moment of assault, as the relocated batteries were not hampered by British counter fire. Late in the Somme offensive this problem was recognized, and the solution was straightforward: stop the destructive fire after a certain point, note German battery locations, and hold fire until Zero. The German guns would receive a prescribed period of neutralizing shelling, after which the British gunners would rest but be ready to fire again on any German batteries that started firing. ³⁶ Unfortunately, for various reasons—mainly pressure from higher command, it seems—this would not be fully adopted for some months.

CB was definitely drawing high-level attention. Armies had to adjudicate boundaries between corps, ³⁷ and one MGRA took an active role in fostering thoughtful staff work. Virtually all the corps that passed through the Reserve Army (later the Fifth Army) during the Somme started filing a number of daily reports, several of which were important for counter-battery work. ³⁸ They became more organized, largely due to the influence of Major-General Herbert Uniacke. He demanded categorized daily reports of British and German activity, information on bombardments, friendly counter-battery fire, and its effects. (Later Uniacke relaxed his paperwork demands; he was clearly getting the artillery to work methodically, and not simply reveling in paperwork.) The methodical thinking that Uniacke forced provided the basis for informed changes rather than guesswork. There is no indication that Uniacke influenced Gough's choice of attacks, but he certainly made the best use of the artillery he had, both on the Somme and later.

Uniacke's reports were an important first step towards the elaborate and thorough intelligence system that would support counter-battery work in 1917. The Royal Flying Corps was vital, and had to be integrated into the effort in order to be put to best effect, but ground and air methods had to be tested, improved, and then standardized. Intelligence was growing in importance, which led to more conferences involving more specialists, a process that expanded (and became more systematic) in 1917. However, it was at corps—the operational, executive level—that CB

burgeoned in 1916. At first some Heavy Artillery Groups (almost always with medium guns) were dedicated to counter-battery work, but still with no staff beyond their own small one, which was largely administrative. A corps would set one HAG to handle CB on the whole corps front, but leave the HAG to its own devices. To handle the workload, special staffs were improvised, and eventually they would be approved and increased. Experience was gained, but it was at junior levels in the hierarchy and erratic. The HAGs also suffered seriously from an organizational quirk. Since most observation and reconnaissance aircraft reported to Corps Wings, it was the corps artillery headquarters that had intelligence information, not the HAG that needed it. ³⁹ There were times when the higher command got involved, especially when new weapons had to be integrated into operations. The tank was the best example in 1916: doctrine governing its use appeared straight from GHQ, but it was largely a product of tank pioneer Ernest Swinton's proposals. He was aware of the tanks' weakness against artillery fire, and wanted tank assaults to be supported by particularly heavy British counter-battery efforts. He got what he wanted. Not only did he have GHQ's backing, but the whole counter-battery effort was part of the tradition of artillery supporting other arms. As usual, the Royal Artillery was implementing other people's priorities. ⁴⁰

The Somme offensive pointed out the growing need for British counter-battery improvements, but much of the development was on quiet fronts. This is not surprising, as the short-handed staffs struggling with day-to-day problems in the Somme battles had little spare time for contemplation. In the quiet Ypres Salient, the Second Army integrated the RFC into the flow of battle—not just pre-arranged shoots—via the system of "zone calls." These allowed batteries allotted for contingencies to fire on opportunity targets. ⁴¹ This was over a year before the Somme, but with the problems of 1915 (lack of resources and a hazy chain of command) still in effect, developments were slow. Further, in quiet sectors the goal was destruction of German guns, rather than their neutralization during an attack. Accuracy—through all the technical aspects of gunnery—was the goal, since the few shells available needed to be used to greatest effect. The benefits of adjusting for meteorological conditions, propellant temperatures, gun wear, and other variables were more obvious in quiet sectors. In active areas there was enough ammunition, and pinpoint accuracy was less important when the mission was saturating an area and suppressing the Germans. Since the main battles were first in line for ammunition, scarcity in the quiet sectors encouraged accuracy and good gunnery.

Experience was distilled into rules of thumb. For instance, to destroy a German gun-pit took 100 6-inch howitzer rounds, 80 8-inch howitzer rounds, or 60 9.2-inch howitzer rounds. On top of this HE fire, a bit of shrapnel from medium guns was added to kill and wound German gunners. This was a step in the right direction, away from the common 1915-16 error of relying purely on guns for all counter-battery work. It seems to have developed in the quiet sectors, which had fewer medium guns and also were seeking the destructive effect that the larger howitzer shells could provide, but it spread to the Somme. Later in the Somme campaign, once the German trenches had been obliterated, there were howitzers available for counter-battery fire, especially in the pauses between infantry attacks. There was still the tension between destructive counter-battery fire and knowing where German guns were during an attack so they could be neutralized, but better intelligence work helped solve the problem. Overall, however, the earmarking of just medium guns to CB faded, allowing guns and howitzers each to be used as circumstances demanded.



Destroyed German gun, near Feuchy (Arras sector), May 1917. The preliminary bombardment before the battle of Arras was the first large counter-battery success enjoyed by the BEF. This destroyed gun is part of that success; its concrete gun position did not save it from thorough counter-battery work. The British soon realized that success required thorough planning, many guns, and very large quantities of shells.

Source: IWM photo Q5245.

Another development that came from outside the main areas of battle was Sound Ranging (SR), the detection of guns through the sound waves generated by their firing. The Third Army, around Arras, was something of a haven for men with new technical ideas. The MGRA, Arthur Holland, had himself been involved in abortive sound ranging attempts as early as 1914, and he also supported innovators in mapping and other topics. Perhaps too much should not be made of the development of SR in a quiet sector, for some methods that worked on quiet fronts were technically unsuitable for active ones. Sound ranging in particular was nearly useless if too many guns were firing at once, and it also required pauses in friendly firing. Such accommodations were unlikely (to say the least) to take place in the midst of battle just so that scientists could experiment. The Third Army was also a leader in keeping an updated, consolidated army-level map of all active German batteries.

During the war maps became vastly important. First, new, more accurate maps were needed; most of Belgium had not been mapped since the 1830s, and northern France was a hodgepodge of old and new surveys. Not only had mapping techniques advanced, but villages, towns, and

cities had expanded, roads had been built, and many terrain features altered. Once the BEF had its first rough survey it continued to improve the maps, and had to update them as new trenches seamed the landscape. ⁴² In 1914 GHQ had the only topographical section; by 1915 each army had one, and in 1917 each corps received one. Beyond mapping, survey was important for artillery. If gunners wanted to shoot 'off the map,' they needed to know where they were and where the enemy was. At first not thought to be of much use for guns in the field, by 1917 survey was the key to new tactics. Survey Sections were given to corps in 1917, and by 1918 they were even divided amongst divisions, with partially-trained artillery personnel helping. ⁴³

One great benefit of the quiet sectors of front in 1916 was the time it gave for training the New Army and Territorial Force gunners. It also allowed some corps to develop tremendous local knowledge. Since many British corps occupied their front for a considerable time, they became experts on the geography, German actions and reactions, and local minutiae. This knowledge could be exploited once conditions changed. X Corps was perhaps the best example: after their five-hundredth counter-battery shoot in the same area, they wrote a report on all the changes that had taken place in the past ten months and analyzed the trends. ⁴⁴ On the other hand, changing corps boundaries—or moving a corps to another sector—would disrupt the artillery efforts that were so heavily dependent on local experience and close RFC liaison. The attachment of the RFC's artillery-spotting squadrons to corps helped develop teamwork and meant that they too learned a sector, but it also increased the disruption when a corps changed front. ⁴⁵ (To anticipate developments slightly, on at least one occasion this problem was bypassed by leaving one corps' counter-battery staff in place when the corps was otherwise relieved. ⁴⁶) But quiet sectors were not entirely somnolent. There were local attacks and raids, and some armies used some artillery as a 'traveling circus.' Corps were reinforced in rotation, and could exploit German weaknesses. A 'traveling circus' also required a corps to think systematically (to identify those weaknesses) and to plan ahead, and those plans could serve as the basis for larger offensives. Sometimes, as at Vimy Ridge, divisions used their local knowledge and planned ahead for the arrival of a whole corps on their front. ⁴⁷

1917: The Problems Solved

On 1 January 1917, counter-battery operations took a step forward. In December 1916, GHQ had recognized that "good organization" was the main contributing factor to counter-battery efficiency. ⁴⁸ So a Counter-Battery Staff Officer (CBSO)—colloquially the 'counter blaster'—was authorized for each corps "owing to the importance of an efficient counter-battery system, as demonstrated in the SOMME battle." ⁴⁹ Just as important, he was granted an adequate staff of an orderly officer and clerks, later supplemented by an aide de camp. ⁵⁰ This was enough for a corps on a quiet sector of the front, but corps engaged in major battles were far busier and scavenged officers from 'resting' corps or subordinate formations. Technically independent of the Commander, Heavy Artillery whose guns he used, the CBSO came directly under the command of the corps artillery commander. There was occasion for prickly officers to stand on protocol, but generally relations were good. ⁵¹ The CBSO was not quite an official commander, nor generally used as a staff officer; most corps artillery headquarters were glad to be rid of the heavy burden of counter-battery work, and allotted the CBSO some artillery to perform his black arts. This trend grew through 1917 and 1918. ⁵² Whether he commanded guns or not, the CBSO was certainly responsible for their employment. ⁵³

Quite naturally, the Artillery Intelligence office was in constant touch. (Appendix 40 gives a period view of artillery intelligence.) Liaison with the corps' RFC squadron was intimate, with a CB representative posted at the squadron base. Aerial observation produced about a third of counter-battery information in trench warfare and a much greater amount in mobile operations. Aerial photographs were even more important, providing both the precise information needed for destructive counter-battery fire and the basis for maps. Photos could be processed in as little as six hours, but reliably within twenty-four. Each corps also had Flash spotting and sound ranging units which provided speedier information that still pinpointed the German guns to between five and twenty-five yards. Flash spotting was quite mobile, needing only a few hours to set up their posts, but sound ranging units needed 36 to 48 hours. Both benefited from more time, which allowed them to improve their communications backwards and sideways (i.e., both to higher headquarters and to each other) and to more accurately survey their locations. Kite Balloons were available in suitable conditions and provided steadier information than aircraft, since they had a longer time aloft and a wider field of view. However, the Germans deployed more long-range guns and drove the balloons further from the front, limiting their utility. When time was critical, CBSOs could give sound ranging or flash spotting units a "direct call" on a battery to speed responses. These batteries, typically heavy howitzers, would have other secondary duties, but if their spotters found a good target they promptly switched to it. Infantry liaison was also a useful source of intelligence, in mobile operations second only to aerial observation.

At the center of an intelligence web, CBSOs could amalgamate information from these varied sources, prioritize it, and order the responses. ⁵⁴ This significantly shortened the decision-making cycle and thus response times. However, this is a somewhat idealized picture; at least one CBSO used a ouija board to select targets. ⁵⁵

Yet for all his resources and good work, the CBSO was a subordinate executive officer, not really a policy maker. He was given a set amount of resources to accomplish a particular goal. Because the BEF was well aware of the importance of counter-battery work, there were generally adequate resources available, but others allotted the guns and defined the tasks. CBSOs would be consulted about means and ends, but once decisions were reached at higher levels they merely implemented the decisions. CBSOs were sufficiently junior that by the time orders reached them there was nothing to do but obey.

It may be useful to consider a fictitious average day for a counter-battery office. Reports of the previous day's activity, friendly and enemy, are examined in the morning. Friendly action is checked to see if it revealed anything, enemy action checked to see what it divulged. A counter-battery conference is held at the corps' RFC aerodrome, making arrangements for the next few days. The RFC sends up a spotter aircraft, which registers guns on various targets, and another one to observe and correct fire on the targets for the day. Patrol aircraft notice German transport moving, and a zone call is sent down. British guns open fire within five minutes, and the area is marked for future harassing fire. (CBSOs generated intelligence as well as receiving it.) German anti-aircraft guns fired on the British plane, and their location is noted for action tomorrow, when another aircraft will lure them into action, just so British guns can shell them. The

returning pilots are debriefed on the runway by the CB liaison officer. Since the wind is from the east, the German guns have to be quiet, or British sound ranging will detect them.

At noon the counter-battery office assembles the daily report of enemy activity, friendly counter-measures, friendly planned fire, intelligence, and other remarks. (It will go to higher headquarters and into the local files, for comparison with several months of data to spot patterns.) The last twenty-four hours have been quiet, although a new German battery has been detected. The battery is assigned a number and marked on the maps with the symbol showing the suspected caliber. German activity yesterday was mainly shelling British infantry; this is not unusual, but is more grist for the intelligence mill. In the afternoon the CBSO goes to the army's fortnightly CB conference. He and his colleagues discuss events and plans, sharing ideas and information. On the whole the Germans have been quiet, but activity is increasing opposite the army's right-hand corps. The MGRA shifts the counter-battery boundary so the Germans will get a little extra fire for their troubles.

After motoring back to the office, news arrives that a relief is suspected opposite one of the divisions. The CBSO and BGRA arrange night firing to catch the Germans in the open. Since the wind has dropped, they decide to gas any German batteries that fire back. By evening, orders are issued for this mission and tomorrow's ordinary program of firing. (Appendix 28 gives some contemporary views on how a counter-battery office should run.)

The BEF's organization gained an advantage over the Germans, who never adopted the corps as the main level of artillery command, using divisions and armies instead. German divisions were assigned the minimum amount of artillery judged necessary to hold their sector and were reinforced as necessary for offensive or defensive operations. But divisional groups were too small, and there were too many of them. Guns would seldom fire on attacks outside their sector, while a British corps could switch fire to cover threatened areas. The division's artillery staff was also too small; while it certainly built up local knowledge, it was quickly swamped by any amount of reinforcing artillery. Because a division's infantry quickly burned out in combat, the divisions had to be rotated, and while the artillery might not be rotated, the change further undermined continuity of command and good organization. The Germans used army-level artillery control to take up some of the slack; it appears that armies commanded most of the reinforcing heavy guns, as well as some reinforcing field artillery. While the Germans cut a layer out of the command chain, by not having a dedicated counter-battery office they were not living up to their reputation for efficiency and thoroughness.

Besides organization, the British had a significant technical edge in counter-battery work over the Germans. Both sides pressed ahead with technological development, but the British built and maintained an advantage in sound ranging. ⁵⁶ The Germans never advanced beyond ear-trumpets to determine rough bearings, when British equipment eventually was accurate to twenty-five yards, and even more accurate in good conditions. ⁵⁷ Some authors credit the Germans with a lead in gun calibration, which they used widely in the 1918 offensives. However, the British had been calibrating their guns for several months before the Battle of Cambrai (that is, before November 1917), and afterwards expanded their calibration facilities, as well as developing a more sophisticated and simpler method. ⁵⁸ There was no great edge in the aerial battles until the

last days of the war. Both sides provided air and balloon squadrons at corps level. The Germans periodically had the upper hand in aircraft technology, but even then the British stoically accepted the casualties and kept their artillery observers flying. Germans adopted and produced more medium caliber guns, thus increasing the average range of their artillery. On balance the British had a small technological edge, but it was not as significant as their organizational edge.

Of course the Germans were not always trying to do the same things that the British were. Defending, they only wanted to disrupt the coordination of British infantry and artillery so that the British infantry would be vulnerable. This did not require such elaborate or centralized control as attacking. If a German division held its ground, it would outflank part of the attacking force and slow the whole attack. It was during long engagements such as the Somme, Arras, or Passchendaele that German CB weaknesses told most. At Passchendaele they had considerable advantages from the terrain, and better handling of their artillery might have made the British offensive untenable. The lack of centralized CB was a liability when the Germans did attack. Even in 1918, their neutralization techniques were not as good as British ones in 1917, nor was their artillery intelligence system as thoroughly developed.

The appointment of CBSOs was just one way that GHQ addressed the whole issue of handling the artillery over the winter of 1916-17. The new policy was a sound one that would last the rest of the war:

Counter-battery work is not a matter of spasmodic effort, but is a continuous operation depending for success on accuracy of fire, continuity of plan, unremitting study and firm control. Its conduct on these lines will alone meet the end in view, namely, the considerable if not total reduction at decisive moments of the volume of hostile artillery fire.... ⁵⁹ (The full text is available as [Appendix 32](#).)

This active policy could still be overruled locally if there was pressing reason. XV Corps planned the coastal operations that were to have formed part of the 1917 Flanders campaign. (Haig wanted not only to attack right along the coast but also to launch a tank-reinforced division in an amphibious hook once the Germans started retreating.) The Germans had the edge both in number of guns and weight of shell. Rawlinson's first step after being given command of the operation was to telephone his MGRA (who was on leave at the time) and begin examining the counter-battery situation. ⁶⁰ After relieving the Belgians, who had held the quiet sector, the British tried their usual active policy. Losses were heavy and results poor; the British were paying heavily and not making any progress. XV Corps then dropped the aggressive policy until the assault was imminent. Instead, they drew up plans outlining many guns would be needed, prepared positions for those reinforcements, and solved all the problems on paper, but they did very little shelling, because there was no point in continuing a failing policy. As it happened, the coastal attack was never made, so the reinforcing guns never arrived, but the plans had been carried out to their logical conclusions. ⁶¹

The Arras/Vimy Ridge offensive in April 1917 was the first time CB played a key role in pre-battle plans. The importance of artillery to the German defense was well understood, and consequently there were grave concerns that the Germans would fire a counter-bombardment on

the British trenches before Zero Hour that would disrupt the entire attack. ⁶² This was so important that it was one of Birch's main concerns in questioning the Third Army's plans for a surprise attack. Major-General Arthur Holland, senior artilleryman of the Third Army, was confident in his plans, largely because he counted on attacking before the Germans reinforced their artillery. He was also confident of detecting and dealing with reinforcing guns, confident to the point of putting his own head in a noose. In a fit of temper at GHQ's conservatism he offered to stand on a chair in the Grand Place of Arras, the chair to be kicked away when the first German shells interrupted traffic in town. ⁶³ GHQ reversed its policy of 1916, when it had assumed initial success and looked to the exploitation. Now they sacrificed *possible* exploitation and *possible* greater success through surprise for a greater certainty of initial success gained by heavy bombardment and counter-battery fire. This change might be because the British effort in spring 1917 was a subsidiary, preliminary attack, with the French slated to provide the breakthrough.



German ammunition wagons destroyed by British shellfire, Mametz Wood, July 1916. Another way to render German artillery ineffective was to wreck the supply system. Here, a small shell dump has been bombarded and several ammunition wagons severely damaged, although few shells seem to have exploded. The lack of permanent damage shows why the BEF focused, where possible, on destructive counter-battery fire. While this was doubtless a successful small bombardment, its effects would have been purely transitory, unless the British infantry happened to capture a particular position because some German batteries were short on shells at the key moment.

Source: IWM photo Q874.

The Third Army's plan was not adopted, but Major-General Herbert Uniacke, senior artilleryman of the Fifth Army, who was temporarily transferred to do the detailed planning after GHQ had intervened and replaced Holland, adopted their methods. Following the updated, post-Somme guidance on attacks, Uniacke and his staff developed a thorough and intelligent plan to deal with the German guns. ⁶⁴ Some artillery were earmarked solely for CB, but it would be reinforced when necessary by guns switched from the bombardment. Counter-battery guns were not switched to the bombardment, so counter-battery fire had some priority over the bombardment. Isolated German batteries were engaged first, and destroyed. Then, nearer Z-Day, concentrated groups of German batteries were shelled, although to a lesser degree because it was harder to destroy larger groups, and those groups had other vulnerabilities. ⁶⁵ Concentrations of guns were prime candidates for neutralization by gas shelling, and their communications and supply routes were heavily shelled. It made little difference during an attack if the German guns were destroyed, out of ammunition, or not firing because their phone cables had been cut—the bottom line was that they were not firing. By 1917, the problem of the unlocated German batteries was held to be greater than undestroyed batteries, so tactics changed; one of the advantages to shelling roads was that it kept German batteries in place so the British could shell them at will. Finally, the BEF accepted that some guns would survive no matter how thorough the preliminary counter-battery work. But the survivors would be even less of a threat with their observation posts (OPs) and communications destroyed. So OPs, telephone exchanges, supply dumps, and headquarters were the final bombardment targets in the Arras plans. With all these destroyed, blinded, or interdicted, the German defensive barrage did not hamper the advance. All this was part of an "unprecedented" counter-battery plan, thoroughly integrated into the main preliminary bombardment program, reinforced by bombardment guns switched over from Zero Hour onwards. ⁶⁶ (The bombardment largely ended at Zero, when the barrage became more important, and the larger howitzers were switched from bombardment duties to counter-battery fire.) So thorough and demanding was the plan that extra officers and clerks had to be drafted in to counter-battery offices. ⁶⁷

However, in the later stages of the offensive some of the critical elements so successful during the first few days were lacking. British guns were thinner on the ground, because the mud delayed their advance and the advance of the supply lines, while the Germans could more readily reinforce. Thus fewer guns had to do more work. Also, the BEF needed to bombard again, because it was facing a new defensive line, which drew away the guns that had reinforced the counter-battery effort. But intelligence was the greatest weakness. The Royal Artillery did not know where the German guns were, and so could neither destroy nor neutralize them. ⁶⁸ Despite the improvements made in the past months, in the later stages of the Arras fighting counter-battery operations resembled those during the Somme.

After the battle some units produced reports on their staff methods. ⁶⁹ It is not clear who these were for, nor do they seem to have been widely circulated. Curiously, the official reports were unofficially circulated, as Lieutenant Colonel Alan Brooke of Canadian Corps sent the one he had drafted to X Corps, which used it as a guide for planning at Messines. ⁷⁰



German observation post near Bazentin-le-Petit, November 1916. Part of the counter-battery effort was shelling German observation posts. While casualties would be few, the German artillery would be disrupted. Depending on the sector of the front, observation posts would be in trees, in buildings (often reinforced with concrete), or simply on high ground.

Source: IWM photo Q4469.

The attack on the Messines-Wytschaete Ridge was perhaps the acme of destructive CB in 1917. (Photo Essay 2 has some aerial photos of CB at Messines.) The attack's objectives were limited beforehand and stayed that way, unlike at Arras when the limited attack was prolonged to distract the Germans from the failed French offensive in the Champagne. The result was that the BEF had ample artillery to deal with a restricted area. The objectives were also chosen with regard to German gun positions, integrating the two branches in a way rare for more ambitious attacks.⁷¹ Further, both IX Corps and II ANZAC Corps had been in the sector for a considerable time and knew the German gun positions and their patterns of employment. (The Germans would move their guns around among a variety of battery positions to avoid being entirely static and predictable. However, during the months that the British corps were watching, patterns emerged.) Roughly thirty percent of the artillery available were allotted to counter-battery work, which was continuous, methodical, and successful. A new formula was used, with German guns on the main front of attack being neutralized on a one-to-one basis, while those on the flanks were assigned one British per four German guns (the formula required thirty percent of the

British artillery). ⁷² While part of this approach was just for planning convenience, it shows organized thinking that would allow rapid planning. In the future, the number of German guns would only need to be counted and the formula applied to determine the requisite number of British guns. If experience showed these ratios to be either too high or low they could be adjusted, but having guidelines was more productive than the empirical methods used earlier. After the preliminary counter-battery work by the thirty percent, during the final two days of the preliminary bombardment all medium and heavy artillery was devoted to counter-battery work. Overall, there were a record number of destructive counter-battery missions before Messines, although the record would shortly be bettered during Passchendaele. ⁷³ Flanking corps also provided fire behind the main ridge, and during the assault fired on German guns that could enfilade the attackers, producing a record number of neutralizations on Z Day.



8-inch howitzer battery under fire, near Boesinghe, 17 August 1917. In the build-up to the Third Ypres campaign the BEF had to fight a long and painful counter-battery battle. This photo shows a tiny fragment of that battle: a near-miss on a single battery, close enough that even the veteran troops are ducking for cover. The Germans eventually lost the struggle to destroy the British guns, but they switched their tactics to harassing fire to deny rest to the British gunners (including using various gasses) and damaging communications routes, like the plank road here.

Source: IWM photo Q5889.

GHQ continued its great emphasis on counter-battery work in this battle, intervening in the Second Army's plans several times. First, they suggested more guns should be used, then checked how they were being used, with Haig himself delving into each corps' plans. Birch also probed the plans and found one corps starting with trench destruction, dedicating only leftovers for CB. He wrote, "This negation of all modern artillery thought appalled me." ⁷⁴ Birch strove to see that everything was done to protect the infantry from German artillery fire, even going so far as suggesting that the tremendous mines laboriously excavated under Messines Ridge be blown before Zero Hour, simply to simulate the assault and provoke the German guns to fire. Birch bent Haig's ear on the subject and it was up to Plumer to defuse the idea, largely by the proposal that the last two days of the preparatory bombardment be entirely devoted to counter-battery fire. ⁷⁵ The matter was so important that there was a high-level conference, at which Birch spoke solely as a technical expert. This was an exceptional case, where technical matters had risen to the level of strategy. But it also shows differences between limited attacks and those intended to be decisive. However, Birch had won his point that CB was the main thrust of the bombardment, with only "a sufficiency" of guns assigned to what had been the key element of the previous year's bombardments, trench destruction. ⁷⁶

Messines Ridge was a prelude to the Third Battle of Ypres, which did not, however, begin immediately. The detailed plans for Third Ypres took some time to work out, but the day after Messines Ridge was taken the Fifth Army issued preliminary orders stressing the importance of mastering the German artillery. ⁷⁷ A prolonged bombardment, including the fiercest counter-battery struggle of the war, took several weeks before the way was ready for the infantry. It took so long because the Germans now realized how much they needed to win the counter-battery struggle. They sent considerable artillery reinforcements, replaced their losses, and introduced delaying tactics when they could not gain the upper hand. But either suited them: if their artillery won the struggle, a victory would be excellent, but a delay bought time for German forces to knock Russia out of the war while also getting closer to the rainy season, which would further delay British attacks.

To start with, before the attack the BEF alternated days between counter-battery work and trench bombardment, then the last two days were entirely devoted to counter-battery work. ⁷⁸ Ammunition expenditure was vast, with II Corps (which was not even in the main attack) firing up to 26,000 rounds per day just for CB; the bombardment and harassing fire were extra. ⁷⁹ Preliminary firing was again intended to destroy German guns, and then just before the attack their positions were to be drenched in gas. Any batteries still firing at Zero would get even more fire. ⁸⁰ Over the years, the Germans had had plenty of time to build gun positions reinforced with wood, bricks, or even concrete. There were so many of them that it was hard to tell which were actually occupied; the British had to redefine their criteria for success as destroyed gun-pits, whether they were occupied or not. ⁸¹ One innovation was to churn the area around pits, which destroyed ammunition and hampered re-supply, an approach that combined counter-battery and harassing fire. ⁸²

Despite these handicaps, the physical advantages the Germans had in occupying the high ground surrounding the Ypres Salient, and the stout efforts by German gunners, the Royal Artillery gradually established fire superiority. By Z-Day, the main German artillery group had lost one-

quarter of its field guns and half its heavies, but the Germans just pulled their guns back beyond British range and replaced their losses. ⁸³ The Allied infantry advance then had the effect of putting the infantry in range of the German guns but beyond the range of their own protective artillery fire. Additionally, the attack was poorly conceived, with strategy overruling operational and tactical considerations, and pressed too far.

Regardless of its strategic location, the Ypres Salient was not a good place to attack. While Haig deserves blame for insisting on an attack there, it is harder to decide what the British (and Allied) strategy should have been. The Germans would certainly have appreciated a relaxation of Allied assaults on the Western Front, while an intensification of Allied efforts in Palestine, Salonika, or Italy would not have had as much effect on Germany. Moreover, a passive Allied posture would not have suited their political or diplomatic goals, either domestically or vis-à-vis the United States. Regardless of these considerations, the BEF attacked around Ypres and had to face conditions there.

Despite mixed opening success on 31 July (which was greatest where it was least important), GHQ continued to press the offensive and CB grew in importance. The fixed defenses were gradually shattered, which left the Germans with only artillery fire and infantry counter-attacks to help hold their ground (the weather helped, but from the German point of view was never bad enough). ⁸⁴ The BEF acted flexibly, adding bombardment artillery to counter-battery tasks or switching artillery from counter-battery tasks and using it for a protective barrage when that was more important. The artillery was still available for CB, but there was no point in continuing neutralization on dazed targets. ⁸⁵ This flexibility shows that Birch and GHQ were not monomaniacs for CB, but were adjusting artillery fire to offer the best possible support of the infantry. Because of the prolonged fighting, destructive CB naturally took on a higher profile than neutralization, and at times was allotted half of all the artillery in the Salient. It was carefully co-ordinated with the rest of the artillery fire, and an elaborate variety of deceptive measures were taken. Creeping barrages were fired exactly as they would be to cover an attack, and when German artillery fired its defensive barrages, British counter-battery staffs noted new targets. ⁸⁶ These could be engaged either immediately or at a more important time in the future. Attack frontages were disguised by expanding CB beyond the attack sector, which also helped to limit German enfilade fire and to prepare the way for future attacks. ⁸⁷

Several times during the battle the Germans changed their tactics, but alert and intelligent British staff officers and commanders soon caught up, and at times even anticipated German changes. ⁸⁸ But in the end the counter-battery contest was decided as much by weight of fire as by how cleverly it was applied. As long as the weather held fair, ammunition and guns could advance and support attacks. ⁸⁹ When the rains came, supply fell off, progress slackened, and casualties mounted.

The subordination of tactics to strategy is borne out by the choice of Flanders as the theater of action. Theoretically, Flanders probably was the right place to attack (not only did it threaten German submarine bases, but taking one rail junction would force a German withdrawal on a very substantial front, roughly forty miles), but not enough attention was paid to details. No breakthrough had succeeded, no attack had been possible without substantial artillery

superiority, and mud had the power to cancel most advances. Flanders would simply reinforce these lessons. Artillerymen did what they could to ease the burden on the infantry, but they could not do everything. Several times the gunners' exhaustion threatened the advance, because while the infantry were rotated through Flanders, there was not sufficient artillery (especially heavy artillery) for adequate rest. When the matter was raised with Haig, he acknowledged the problem but insisted that the offensive continue because the strategy was right.

In contrast to the immense, bludgeoning counter-battery effort at Third Ypres, the next British attack was with a rapier. The Battle of Cambrai saw an entirely different emphasis, made possible by the presence of tanks. These dealt with the German barbed wire, permitting a surprise attack. ⁹⁰ Surprise meant that the Germans would not have infantry or artillery reinforcements in place, and that meant no preliminary bombardment was necessary. The counter-battery effort could be devoted entirely to neutralizing the German guns—there were only 34 facing the main assault, showing the benefits surprise could offer—and only until friendly troops got close enough to attack those guns directly. The Royal Artillery also implemented new methods for accurate shooting (predicted fire), but also made the most of thorough planning. Of the 1,003 guns available, two-thirds would be devoted to CB, a ratio that became standard for British surprise attacks. As before, the German guns would not be the sole target for neutralization. Observation posts would be blinded with smoke screens, while headquarters and telephone exchanges were shelled to disrupt command and communications. ⁹¹ German batteries received a mix of HE and gas calculated to reduce their efficiency if they fired at all. Special provision was made for German anti-tank guns: once spotted (either from the ground or by special RFC patrols), they would be shelled for five minutes. ⁹²

After an excellent break-in progress slowed, and the success of the German counter-attack on 30 November was largely due to bad British counter-battery intelligence. Poor weather had kept the RFC from flying, while sound ranging and flash spotting networks had yet to be established on the captured ground. ⁹³ Counter-battery intelligence was a key part of British defensive intelligence, because the Germans had to muster a large number of guns to attack; the lack of counter-battery intelligence heightened the overall German surprise. While the BEF held little new ground at the end of the battle, the net results of the battle were good from the artillery perspective. The major new concept—predicted fire—had been proven and would become the norm in 1918. Secrecy had been preserved, and the same steps could be repeated while some aspects that were wanting (such as too-short smoke barrages) could be improved. ⁹⁴

Again in 1917 there was progress in counter-battery work in the quiet sectors of the British front, but it was less marked since the basic methods had been decided and a framework established. Even in the midst of major battles, daily and weekly reports were produced, and in fact they were even more important during rapidly changing situations. Armies and GHQ paid ever more attention to counter-battery performance as it became clear how vital it was for victories. Yet attention was seldom interference, especially as the corps staffs became more proficient and proved themselves. Instead of being forced to deal with distracting visits by generals, front-line soldiers found that their experience was solicited and distributed in a stream of informational pamphlets. On the other hand, by 1917 many units had their own way of doing things and may have given scant attention to official methods. One important way expertise was shared was by

loaning officers. Often corps at rest would send their staff officers to other corps engaged in battle to help with the extra work. ⁹⁵ In addition, courses were available for staff officers, and there was often a rotation of junior officers from brigades to corps headquarters to keep both fresh. ⁹⁶

There were two main areas where information still came from the top down: gas warfare and new technologies. With new kinds of gas constantly being introduced, there was a stream of pamphlets on its use, which was reasonable since frontline troops lacked any experience with the new gasses. ⁹⁷ Information included how many shells were necessary to cover a given area and various tactical schemes to maximize effectiveness. The 1918 editions had more vicious, more cunning, more effective tactical ideas, which were clearly the product of experience. ⁹⁸ Smoke shells were also new, their use also needed to be explained. A variety of pamphlets dealt purely with smoke shells, while others discussed how smoke would affect tactical questions. ⁹⁹

The technical aspects of gunnery had to be taught not only to the New Armies and Territorial gunners but also to many 'horsey' artillerymen who had disdained it before the war. While basic standards were rising, new methods were constantly being introduced (the most important of which were calibration and survey), and this constantly raised the bar. These were the keys to surprise at Cambrai, and it was realized that surprise and its benefits could be repeated only if units were properly trained. New tactical methods appeared, like the "one round shoot," in which artillery in range fired one round timed to arrive simultaneously on a given target. Either a brigade would fire, or all corps artillery might fire. ¹⁰⁰ This was a model of efficient communications and staff work, and could be devastatingly effective. ¹⁰¹ It is noteworthy that the concerns for Cambrai had centered on the predicted barrage, rather than on predicted counter-battery work, which had already been proven in the quiet sectors.

1918: Maturation of the System

Although the BEF switched over the winter of 1917-18 to a general defensive posture, this had little effect on counter-battery work. ¹⁰² Counter-battery fire still had a high priority; indeed, periodic heavy counter-battery shoots, trench bombardments, and raids were the BEF's only aggressive activities. The lack of change was silent acknowledgment that the system of Counter Battery Staff Officers was working. ¹⁰³ But counter-battery fire still fit into an overall combat framework, and its importance could be downgraded. On those sectors of the front with poorly developed defenses (and where British working parties would be exposed to German fire), the decision was made not to try to dominate the Germans through intense counter-battery fire but instead to slacken all British fire and accept a live-and-let-live status quo. ¹⁰⁴ This was a decision for formation commanders, and they could make it knowing what results the artillery would produce through aggressive counter-battery fire and weigh that against other considerations.

Thinly held areas, like that of the Fifth Army along the Somme, were even more reliant upon their artillery than the more heavily manned areas near Ypres and Arras; artillery provided a bigger percentage of the Fifth Army's firepower. ¹⁰⁵ However, the Fifth Army had a problem beyond the paucity of troops, namely that the French had left the trenches in poor shape, so even the aggressive Hubert Gough adopted a live-and-let-live policy. ¹⁰⁶ ([Appendix 30](#) has the Fifth

Army's policy guidelines.) This prevented any firing at all until the Germans realized that the British had replaced the French. Even once the Germans realized the change, the Fifth Army kept a relatively low profile. It did plan to begin widespread and intensive counter-battery work as soon as any German offensive preparations were detected, but by that point the Fifth Army lacked the artillery strength to make much difference.

In ordinary trench warfare, CBSOs collected data and evaluated it for their own purposes. Under these new conditions, they were intelligence producers for the BEF as a whole. Since the Germans held the initiative, guessing German intentions was vital, and CBSOs produced useful material about German artillery deployment. If German guns fired mainly from distant positions and harassed British communications, it indicated defensive intentions, or maybe a withdrawal. German shelling of roads in British lines, building alternate positions in greater depth, and not repairing inadvertent damage to their own roads were other signs of defensive intentions. But if more guns arrived, roads and bridges were repaired, or guns were deployed forward, it indicated an impending attack. In addition, two other activities provided important intelligence. The Germans never developed the knack of maintaining a constant rate of artillery activity. Before an attack, their firing first rose as batteries familiarized themselves with an area; then, as orders to restrain activity took effect, the rate of fire fell. Nor did the Germans entirely trust calibration behind the lines, and as a result they almost always fired a few ranging shots. These patterns of German behavior meant that CBSOs had a great deal of useful information about German artillery, and thus about German intentions on a given front. This, together with the high profile of CB in ordinary trench warfare, meant that CBSOs gained responsibility during the winter of 1917-18.

When the Germans attacked on 21 March the BEF's elaborate counter-battery infrastructure collapsed. Wire-based communications failed, the Royal Flying Corps was driven back, sound ranging and flash spotting networks were disrupted, headquarters had to displace and thus lost contact, and the Royal Artillery had more important targets. Heavy artillery was soon captured, evacuated from the area of operations, or dispersed among the infantry divisions. Regardless of what happened to the guns, counter-battery work regressed to firing at observed German batteries. Poor RFC liaison was perhaps the most significant failing, since it deprived headquarters of information. Although those artillery brigades that had wireless sets could have worked with aerial spotters, the headquarters could not organize the cooperative effort because their communications nets were ruined. ¹⁰⁷

The April offensive around Ypres and the Lys saw much the same situation. With the front no longer static, the Royal Artillery had to use different methods. Heavy guns were parceled out to divisions, ending any chance for more integrated artillery use on counter-battery fire or any other mission. Yet, while centralized control was theoretically best, the infantry desperately needed some support, and the decentralized artillery provided that. ¹⁰⁸ Moreover, the weakened communications networks generally made centralized control impossible. Some formations, like XV Corps, firmly resisted dispersion. They found concentrated counter-battery and counter-preparation fire far more effective when using the whole corps' resources than with just a division's reinforced artillery. ¹⁰⁹ Still, these formations could stay centralized only as long as their front held, because once they had to move, the communications networks that permitted

concentrated fire from dispersed guns failed. Both policies had points in their favor, and retaining guns under corps control was preferable but was clearly not always possible. Once the action became mobile, it was "disastrous" to rely upon central control: orders would arrive late (if at all), and direct fire again came into play. ¹¹⁰

The objectives for CB also needed re-evaluation. In trench warfare, the policy was to neutralize all active German guns, then destroy as many as the British shell supply allowed. ¹¹¹ During its own surprise attacks the BEF emphasized neutralization, counting on capturing the guns later. But neutralization did not work with the BEF on the defensive. German artillerymen stuck to their guns, inspired by their part in the supposedly war-winning offensives, and the Germans had such a preponderance of guns that they could accept a few firing at a reduced rate. In response, GHQ rapidly changed policies across the BEF. Now, rather than seeking to slow the whole attack, overwhelming fire was concentrated in a few sectors. ¹¹² This was destructive fire being deployed in defense, a move that ran against all tradition and experience and one that could only be made with a highly centralized command structure.

Even when the weight of German attacks was switched from the British to the French sector, this remained the major defensive policy. Counter-battery fire was to be continuous, with the usual trench-warfare goal of destroying as many German guns as possible. Yet there could only be an artillery duel when there were no more important targets, i.e., when the infantry did not need immediate support. If a German assault was expected, concentrations were fired on narrow sectors, again to destroy guns and especially artillery personnel. While the British policy might not destroy a high percentage of German guns, it might disorganize the attack by weakening a sector, and that weakness would then ripple through the rest of the attack. The decentralized German infiltration tactics were intended to minimize this sort of problem but could not make it go away. This policy characterized the lull between the halt of German attacks in May and the resumption of major Allied attacks in August. ¹¹³

The British front did not stagnate during the lull. Local attacks pushed the Germans out of important positions, and raids kept things lively. The small operations fit well with the new counter-battery policy, and when something bigger was attempted the only requirement was more guns. Surprise, as at Cambrai, was a precondition for several such attacks, and that made CB a high priority, because in a surprise attack the German artillery formed such a significant part of their defensive firepower. For example, at Hamel on 4 July two-thirds of heavy artillery was used for counter-battery work, and (to safeguard surprise) none of it had been allowed to register. ¹¹⁴

The Battle of Amiens (8-14 August) opened the series of connected Allied offensives that broke the German Army and led to the Armistice. CB was handled in a manner nearly identically to Cambrai, although there was more concern about German counter-preparation, a barrage fired on the assembled attackers even before they attacked. The British artillery that moved into the Amiens sector was kept silent until the last night, and even then it could only fire if the Germans fired counter-preparation. ¹¹⁵ Interestingly, this decision was delegated to the CBSO, an acknowledgment of his growing role as a commander, one with crucial but limited responsibilities, but also the man with the right information. ¹¹⁶



Abandoned German howitzers. This is an effect of one kind of counter-battery fire: the German guns have been abandoned because British shelling crippled the horses, and left the guns unable to move. There appear to be no human casualties suffered, which suggests low German morale—the surviving gunners may have ridden off on the uninjured horses.

Source: IWM photo Q58419.

The counter-battery results were impressive: some German batteries were found abandoned with muzzle-caps still in place after the gunners fled, while others were found abandoned with all their horses killed as they tried to move. ¹¹⁷ The British infantry took few casualties from German shellfire as they advanced because the German artillery had largely been taken out of action. ¹¹⁸ During the day, many opportunity targets were engaged, with ordinary German batteries and anti-tank (AT) guns the highest priorities. The advance continued, although within 48 hours counter-battery fire had become much less effective since intelligence and communications (especially by wire) had deteriorated. There were cases where the corps headquarters were better informed than their subordinates closer to the action because the corps received information from a wider range of sources (including the Royal Air Force), while a brigade would only know what information the runners could bring to it. ¹¹⁹ Most counter-battery shoots for the rest of the battle were zone-calls (a few batteries responding to a newly

detected target in their sector), which were obviously less satisfactory since fewer guns would fire and there was little chance of knocking out any German guns. ¹²⁰ German batteries might not be spotted, and if they were they might have done their damage before the British artillery could respond.

Some of these aspects were repeated in later actions, although the use of tanks (a key point at Amiens) in the attack was less common. Precisely because tanks were rare, great care was paid to suppressing the German anti-tank guns. Aeroplanes were assigned specifically to search for AT guns, each with a 60-pounder battery waiting so the AT gun could be engaged immediately and overwhelmingly. ¹²¹

Counter-battery fire was effective at the opening of an attack, but as co-ordination declined on succeeding days, the infantry found it harder and harder to gain ground. The British infantry really only needed the German artillery to be suppressed long enough to allow a break-in; thereafter they could work themselves forward through the German infantry, whose morale was crumbling. ¹²² Typically, 50-70 percent of the available heavy artillery was under the control of the CBSO, with only a minority bombarding to more directly support the infantry. But the CBSO was becoming more of an all-round artillery commander. Although his first task during an attack was counter-battery fire, the CBSO also controlled the fire for interdicting German communications, especially with reinforcing or retreating troops. ¹²³ This was the peak of responsibility for CBSOs, who now generally had autonomy over counter-battery fire and the bulk of harassing fire. ¹²⁴ In mobile operations, it was generally impossible to get sound ranging or flash spotting units into action, which increased dependence on the RAF (the RFC's name was changed in April 1918). Zone calls became the main source of artillery information when the Germans were not in prepared positions, and the Royal Artillery benefited greatly from the rapid decline of German air power. Still, mobile operations meant greater decentralization (even corps headquarters could not keep up), and frequently less-experienced divisional officers had to manage counter-battery work themselves. ¹²⁵ They lacked the experience of specialist counter-battery personnel, as well as the full range of intelligence sources that fed into the corps. Eventually the plan was to train one officer per heavy artillery brigade in counter-battery operation, but the Armistice rendered the point moot. ¹²⁶

In contrast to more mobile operations, when the Germans held strong positions like the Hindenburg Line, they had to be ejected with a properly supported attack. Full bombardment plans were developed, often on very short notice, and fired by guns that moved straight into their firing positions from the line of march. ¹²⁷ Despite these time pressures, the latest procedures were used, survey and resection being possible in not much more than 40 hours. ¹²⁸ Counter-battery operations were now cut-and-dried. The first step was to isolate German guns from resupply of ammunition by cratering the road and tracks; this also made withdrawing the guns difficult and increased the number of guns the British infantry captured—guns that would not be available for the next battle. Step two was destructive fire on the pinned German batteries. After Zero Hour, any surviving guns would be neutralized. ¹²⁹ Showing their close interrelation, the interdiction and harassing fire program was often as detailed as the counter-battery program. Bombardments like this gave the BEF fresh impetus, and divisions could again advance with much less artillery, at least until the Germans organized another strong position. Whenever the

British advance faltered, corps control of artillery was rapidly and smoothly reasserted, bringing up more artillery and staff officers, along with the intelligence resources they controlled. All this would provide the impetus to get through the next German line—if enough supplies could be pushed up. When supplies ran low, formations shifted to concentrated harassing fire, which could also be destructive in its effects. When the Third Army was "almost stationary" after 26 October it organized aggressive counter-battery and harassing fire, supported by the full panoply of RAF, balloons, sound ranging, and flash spotting. When the Second Army had to pause at the Scheldt, it only advanced enough guns for protection against German counter-attacks and to conduct destructive counter-battery fire. ¹³⁰

Conclusion

Counter-battery fire rose from being a low-priority, haphazard part of artillery tactics to an organized and integrated element of the battle plan. In the early days, counter-battery fire was neglected because it was less important than other missions. Once the Germans changed their defensive tactics and emphasized artillery fire, the value of good counter-battery fire became clear, but effective means were lacking. The most that was possible was a brief flurry of shells to encourage the Germans to cease their fire. The Germans could avoid the British counter-battery efforts by withdrawing their guns out of sight of the British front line. From then on, the BEF sought destruction of German artillery rather than its neutralization, but it was generally not possible in the early days. Faltering attempts were hampered by technical deficiencies, but these were gradually overcome by the end of 1916. The final missing link was a co-coordinator of all the information. The appointment of Counter Battery Staff Officers was the key step, although there had been officers in charge of counter-battery fire before. The difference was that now counter-battery fire had the full-time attention it needed, and extra planning help was made available to corps in the middle of large battles. Over time, as CBSOs gained experience with the Germans in their sectors, they were gradually given command of guns until at times in 1918 they rivaled the Commander, Heavy Artillery for control of heavy artillery.

Although having friendly artillery fire directed at enemy artillery is intuitively a purely artillery matter, counter-battery fire involved virtually the whole of the BEF. The artillery needed help (especially from the Royal Engineers and RFC/RAF) to do its best, and it never lost sight of the fact that this 'gun duel' was to help the attacking infantry. When those attackers needed German guns shelled, that was a top priority; when something else was more important, artillery turned to the new concerns. Artillerymen used every wile to get the best results, but never abused the quasi-independence of counter-battery activities to pursue their own ends.

Notes:

Note 1: FSR 1909, §106, ¶5; *FAT 1914*, §223. [Back](#).

Note 2: Rawlins, *History*, 250. [Back](#).

Note 3: FSR 1909, 133. [Back](#).

Note 4: *FAT 1914*, 347, 276. [Back](#).

Note 5: John Terraine, *Mons: Retreat to Victory* (London: Batsford, 1960), 147. [Back](#).

Note 6: *OH 1914*, vol. 1, 434-6. [Back](#).

Note 7: *Ibid.*, 419; Haig Diary, 16 September and 4 October 1914. [Back](#).

Note 8: *OH 1914*, vol. 1, 134, n. 6. [Back](#).

Note 9: *OH 1914*, vol. 2, 81, 82, 83, 106. [Back](#).

Note 10: Smith-Dorrien to GHQ, 4 November 1914, WO95/654. [Back](#).

Note 11: CDS2, "Notes from the Front," November 1914. [Back](#).

Note 12: *OH 1914*, vol. 2, 165. [Back](#).

Note 13: Nicholson, *Gunnery of Canada: The History of the Royal Regiment of Canadian Artillery* vol. I, 1534-1919, (Toronto: McClelland and Stewart, 1967), 222, 244, 240. [Back](#).

Note 14: See A. F. Becke, *Order of Battle of Divisions four volumes* (London: HMSO, 1935-45); most Territorial Force divisions—those of the first three New Armies—had this happen. [Back](#).

Note 15: *OH 1915*, vol. 1, 86-7. [Back](#).

Note 16: There was a brief period of being called Reserve Heavy Artillery, but that acronym already belonged to the Royal Horse Artillery. [Back](#).

Note 17: *OH 1915*, vol. 1, 313. [Back](#).

Note 18: J. B. A. Bailey, *Field Artillery and Firepower* (Oxford: Military Press, 1989), 62, note 61. [Back](#).

Note 19: R. C. de Winton to Edmonds, CAB45/141. [Back](#).

Note 20: V Corps CHA diary (WO95/757), 2 March 1916; No. 1 HARG diary (WO95/86), 13 April 1915; No. 2 HARG diary (WO95/87), 9-10 May 1915. [Back](#).

Note 21: No. 1 HARG diary (WO95/86), 9-10 March 1915. [Back](#).

Note 22: *Ibid.*, 12 March 1915. [Back](#).

Note 23: *Ibid.*, 9 March 1915. [Back](#).

Note 24: Ibid., 24 March 1915. [Back.](#)

Note 25: I Corps BGRA diary (WO95/619), 27 September 1915. [Back.](#)

Note 26: No. 1 HARG diary (WO95/86), 10 May 1915 and 14 June 1915. [Back.](#)

Note 27: IV Corps BGRA diary (WO95/728), 2-26 September 1915. This may have been a local problem with the chain of command; see Chapter 9. [Back.](#)

Note 28: Rawlins, *History*, 105; III Corps BGRA diary (WO95/689), 22 November 1915. [Back.](#)

Note 29: Farndale, *History of the Royal Regiment of Artillery, Western Front 1914-18*, 122. [Back.](#)

Note 30: *OH 1915*, vol. 2, 306, 376. [Back.](#)

Note 31: II Corps BGRA diary (WO95/651), 25 April 1916, 26 July 1916. [Back.](#)

Note 32: III Corps BGRA diary (WO95/690), 28 June 1916. [Back.](#)

Note 33: V Corps BGRA diary (WO95/756), 2 September 1916. [Back.](#)

Note 34: X Corps CHA diary (WO95/862), c. 18 June 1916; XIII Corps BGRA diary (WO95/901), 23 June 1916; VII Corps BGRA diary (WO95/811), 13 June 1916. [Back.](#)

Note 35: III Corps BGRA diary (WO95/690), 12 August 1916. [Back.](#)

Note 36: II Corps BGRA diary (WO95/651), August and October 1916. [Back.](#)

Note 37: *OH 1916*, vol. 2, 171. [Back.](#)

Note 38: I ANZAC Corps upheld the Australian reputation for not suffering paperwork gladly: WO95/992. See II Corps BGRA diary (WO95/651), July 1916 for an indication of the changes Uniacke forced. [Back.](#)

Note 39: Rawlins, *History*, 108. [Back.](#)

Note 40: CB remained a high priority for tanks: SS164, "Notes on the use of tanks....," May 1917. [Back.](#)

Note 41: No. 2 HARG diary (WO95/87), 14 or 16 June 1915. [Back.](#)

Note 42: Probably the best book on the subject is P. Chasseaud, *Topography of Armageddon: A*

British trench map atlas of the Western Front, 1914-1918 (London: Mapbooks, 1991). [Back](#).

Note 43: After the war, the Royal Artillery took over survey responsibility from the Royal Engineers. [Back](#).

Note 44: X Corps BGRA diary (WO95/863), 28 September 1917. [Back](#).

Note 45: II Corps CHA diary (WO95/654), September 1916. [Back](#).

Note 46: XVIII Corps diary (WO95/955), October 1917. [Back](#).

Note 47: Bailey, *Field Artillery*, 139 note 28. [Back](#).

Note 48: SS131, "Co-operation of Aircraft with Artillery," December 1916 edition. [Back](#).

Note 49: OB/1911 of 17 December 1916. Technically CBSO was just the common term, and the official term was "Lt. Col., RA, attached for Counter Battery Work": RA Nomenclature Committee, Horne Papers, IWM. Albert P. Palazzo, in "The British Army's Counter-Battery Staff Office and Control of the Enemy in World War I," *Journal of Military History* 63:1 (January 1999): 55-74, comes to much the same conclusions, especially about the importance of the permanent CBSO organization. [Back](#).

Note 50: Circular 121/Staff/4903 of 25 February 1918. "Artillery Experiences in Messines Battle, IX Corps." (WO95/841) [Back](#).

Note 51: Canadian Corps changed this arrangement practically but not officially in 1918, with the CBSO coming under the CHA. The modified system was adopted by the British after the war and lasted through WWII. Nicholson, *Gunners of Canada*, 367. [Back](#).

Note 52: Canadian Corps probably pioneered this development; "Notes on Counter Battery Work in connection with the Capture of the Vimy Ridge by the Canadian Corps on April 9th 1917," WO/95/1059, ¶4 (hereafter, "Canadian CB at Vimy"). Lt. Col. A. F. Brooke was a staff officer to the GOCRA Canadian Corps from the end of 1916 until the Armistice. [Back](#).

Note 53: A. G. L. McNaughton "Counter Battery Work," *Canadian Defence Quarterly* 3:4 (1926): 15, from which this section largely draws. McNaughton was first CBSO and then CHA of Canadian Corps. After becoming CHA he kept much CB authority during mobile operations, but in trench warfare he left it to the CBSO, Major H. D. G. Crerar. [Back](#).

Note 54: Rawlins, *History*, 19-20; Bailey, *Field Artillery*, 62 and note 62. [Back](#).

Note 55: H. H. Hemming Papers, IWM. [Back](#).

Note 56: SS580, "... what can be done by our Batteries to avoid detection by enemy Sound Ranging," 14 September 1917, shows the differences between British and German technology.

[Back.](#)

Note 57: In an example of lateral thinking, inspiration came to a British scientist in the latrine. A rent in the canvas let a cold blast of air onto exposed flesh, showing him that the flight of the shell could be detected, not just the sound of discharge. See Sir Lawrence Bragg, A. H. Dowson, and H. H. Hemming, *Artillery Survey in the First World War* (London: Field Survey Association, 1971). Daniel J. Kevles, "Flash and Sound in the AEF: The History of a Technical Service," *Military Affairs* 33:3 (December 1969): 374-84, discusses the relative merits of British and French sound-ranging equipment, and leans towards the British equipment. [Back.](#)

Note 58: III Corps BGRA diary (WO95/692), 29 June 1917; II ANZAC Corps CHA diary (WO95/1034), section on Loring's Group, late December 1916 or early January 1917; Canadian Corps GOCRA diary (WO95/1059), August 1918. [Back.](#)

Note 59: SS139/3, January 1917. [Back.](#)

Note 60: Rawlinson Diary, 25 May 1917. [Back.](#)

Note 61: XV Corps diary (WO95/925), August-September 1917. [Back.](#)

Note 62: *OH 1917*, vol. 1, 201-2. [Back.](#)

Note 63: Allenby Papers, LHC, 6/VII/7. [Back.](#)

Note 64: See SS135, "Instructions for the Training of Divisions for Offensive Action," (December 1916), which discussed bombardment, barrages, and CB. [Back.](#)

Note 65: *OH 1917*, vol. 1, 313. [Back.](#)

Note 66: *OH 1917*, vol. 1, 312. See also *OH 1917* Appendices, 44-51, 52-8. [Back.](#)

Note 67: Rawlins, *History*, 117-9; "Canadian CB at Vimy," ¶6. [Back.](#)

Note 68: Even when batteries were firing in view of British infantry, liaison could fail. *OH 1917*, vol. 1, 382. [Back.](#)

Note 69: "Canadian CB at Vimy" is one very thorough example. [Back.](#)

Note 70: H. W. Wynter, "The Revival of the Barrage," *JRA* 70:4 (1943): 272. Wynter was then with X Corps. [Back.](#)

Note 71: Rawlins, *History*, 124. [Back.](#)

Note 72: X Corps BGRA diary (WO95/864), April 1917; GHQ took direct interest in overseeing counterbattery fire on the flanks; see Rawlins, *History*, 126. [Back.](#)

Note 73: Rawlins, *History*, 131. [Back.](#)

Note 74: Haig Diary, 26 May 1917-4 June 1917; Birch quoted in Anstey galley proofs, 193. [Back.](#)

Note 75: GHQ to Second Army, 29 May 1917, and conference 30 May 1917, WO158/215. [Back.](#)

Note 76: Birch to Harington, 16 May 1917, in Anstey Papers. [Back.](#)

Note 77: Anstey proofs, 135. [Back.](#)

Note 78: *OH 1917*, vol. 2, 43, 47. [Back.](#)

Note 79: This is heavy artillery ammunition; field guns would be firing still more. II Corps CHA diary (WO95/656), August 1917. [Back.](#)

Note 80: *OH 1917*, vol. 2, 49 and note 1. [Back.](#)

Note 81: *OH 1917*, vol. 2, 136. [Back.](#)

Note 82: Rawlins, *History*, 135; I ANZAC Corps BGRA diary (WO95/994), 11 September 1917. [Back.](#)

Note 83: *OH 1917*, vol. 2, 93; 138, note 1. [Back.](#)

Note 84: *Ibid.*, 300-1. [Back.](#)

Note 85: CB was still the main priority until Z+15, when the infantry were at their most vulnerable. Bailey, Field Artillery, 140, note 32; Rawlins, *History*, 128 [Back.](#)

Note 86: X Corps BGRA diary (WO95/864), 3 September 1917. [Back.](#)

Note 87: *OH 1917*, vol. 2, 184. [Back.](#)

Note 88: Rawlins, *History*, 146-50. [Back.](#)

Note 89: *OH 1917*, vol. 2, 348, note 1. [Back.](#)

Note 90: *OH 1917*, vol. 3, 10-12. [Back.](#)

Note 91: *OH 1917*, vol. 3, 326-27. [Back.](#)

Note 92: IV Corps BGRA diary (WO95/729), 18 November 1917. [Back.](#)

Note 93: *OH 1917*, vol. 3, 332. [Back.](#)

Note 94: *Ibid.*, 286-7, 333. [Back.](#)

Note 95: IV Corps noted in November 1916, "Staff on loan to HA 2nd Corps. HQHA 4th Corps still theoretically resting...", and II ANZAC helped I ANZAC in September 1917. WO95/728 and WO95/994. [Back.](#)

Note 96: This was true even for experienced officers. XV Corps BGRA diary (WO95/925), 7 February 1918. [Back.](#)

Note 97: E.g., SS158, "... Recent Operations on the Front of First, Third, Fourth and Fifth Armies," May and July 1917. [Back.](#)

Note 98: See SS134, "... the use of Lethal and Lachrymatory Shells and Bombs," December 1916, August (?) 1917, and March 1918. [Back.](#)

Note 99: E.g., SS175, "... the use of Smoke"; SS214, "Tanks and their employment..."; SS135 "The Division in Attack" (January and November 1918 eds.). [Back.](#)

Note 100: XVII Corps BGRA diary (WO95/955), August 1917. [Back.](#)

Note 101: On occasion it was actually over-used: I Corps BGRA diary (WO95/619), June and July 1917. [Back.](#)

Note 102: See Bailey, *Field Artillery*, 145-8. [Back.](#)

Note 103: SS131, revised edition, December 1917. [Back.](#)

Note 104: E.g. ANZAC Corps BGRA diary (WO95/995), 3 February 1918. [Back.](#)

Note 105: *OH 1918*, vol. 1, 125. [Back.](#)

Note 106: III Corps BGRA diary (WO95/694), 26 January 1918. [Back.](#)

Note 107: See "Notes on Recent Fighting No.5 - Artillery" (April 1918). CBSOs were urged to stay with corps headquarters, since they should be located near the aerodromes. [Back.](#)

Note 108: *OH 1918*, vol. 2, 95. [Back.](#)

Note 109: XV Corps BGRA diary (WO95/925), 16 April 1918. [Back.](#)

Note 110: *OH 1918*, vol. 2, 293, 521, 523-4. [Back.](#)

Note 111: This was the general policy adopted after the war. R. W. MacLeod, "Some Notes on Counter-Battery Work with Divisional Artillery," *JRA* 63:1 (1936): 12-32. [Back.](#)

Note 112: XIII Corps BGRA diary (WO95/902), 20 July 1918. [Back.](#)

Note 113: V Corps BGRA diary (WO95/756), 12 July 1918; XIX Corps BGRA diary (WO95/968), 29 June 1918. [Back.](#)

Note 114: SS218, "Operations by the Australian Corps against Hamel ...," July 1918. [Back.](#)

Note 115: *OH 1918*, vol. 4, 17, 23. [Back.](#)

Note 116: Ibid., 26-7. This may have been peculiar to the Canadian Corps, who called their senior gunner GOCRA, and the CBSO was instead the Counter-Battery Officer. After the war, CBO became standard nomenclature. Nicholson, *Gunners of Canada*, 242, 367; Anon., "The Organization of Counter-Battery Work in Mobile Warfare by a Medium Brigade Allotted to a Division," *JRA* 63:2 (1936): 171-6. [Back.](#)

Note 117: *OH 1918*, vol. 4, 47. [Back.](#)

Note 118: Director of Medical Services, Fourth Army, quoted in Rawlins, *History*, 220. [Back.](#)

Note 119: Canadian Corps GOCRA diary (WO95/1060), 14 August 1918. [Back.](#)

Note 120: *OH 1918*, vol. 4, 129. [Back.](#)

Note 121: IV Corps BGRA diary (WO95/730), 19 August 1918. [Back.](#)

Note 122: *OH 1918*, vol. 4, 184, 222; *OH 1918*, vol. 5, 33. [Back.](#)

Note 123: *OH 1918*, vol. 4, 264. [Back.](#)

Note 124: Canadian Corps delegated even more. As attack turned into exploitation, some RGA was devolved from corps to divisions, but if more help was needed the CBO was responsible. *OH 1918*, vol. 5, 636-7. [Back.](#)

Note 125: Rawlins, *History*, 224-5. [Back.](#)

Note 126: Ibid., 244. [Back.](#)

Note 127: *OH 1918*, vol. 4, 477, 490. [Back.](#)

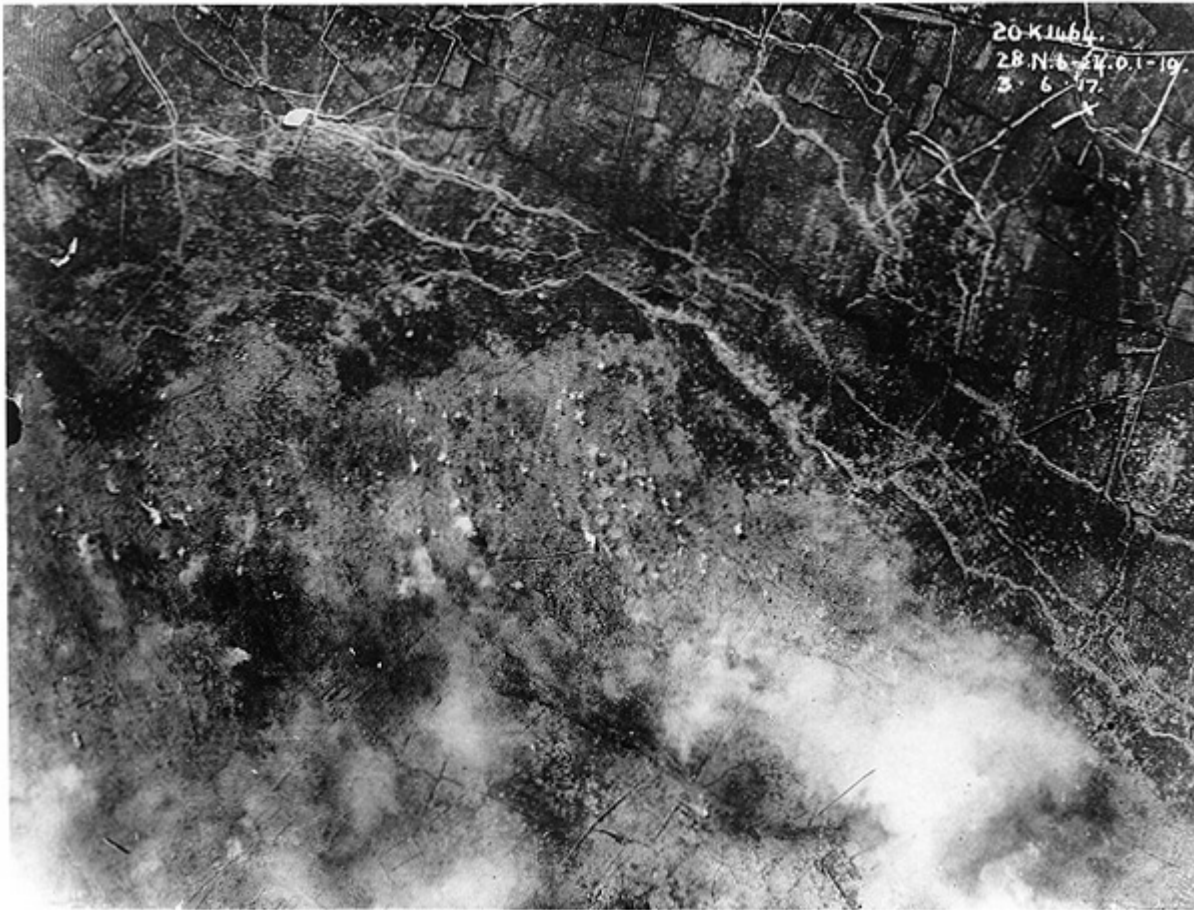
Note 128: *OH 1918*, vol. 4, 335. [Back.](#)

Note 129: Mustard gas was particularly effective at interdicting German movement, as their gas defenses were worse than British ones. It was first available for the breaking of the Hindenburg Line. [Back](#).

Note 130: *OH 1918*, vol. 5, 391-2, 450. [Back](#).

6. Supporting the Attack: Barrages and Direct Fire

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Aerial photo of a barrage, location and date unknown. As this photo shows, a barrage "covered" an area, but that really did not mean that nothing in that area could live. Most defenders in the shell-swept area would probably have their heads down, which was the goal, but they might well survive. This also shows that the shells did not all fall on a single line, even when they were supposed to.

Source: IWM photo Q27221.

Introduction

Artillery, in the eyes of the troops it supports, performs two main tasks in a battle: it first makes an assault possible, and it then covers that assault with fire. We have already traced how the Royal Artillery prepared the way for attacks with bombardments, and how large the voice of the infantry and General Staff was in designing bombardments. As might be expected, they were even more influential when arranging the supporting fire.

Before the war, the British Army had no concept of a creeping barrage, or indeed of any sort of linear or area barrage of artillery fire covering an attack. While *Field Artillery Training* contained the germs of a creeping barrage (Section 157 mentioned fire lifting onto successive targets), to see them amid everything else in *FAT* requires a generous dose of hindsight. During the war, nobody pointed to Section 157, while they certainly did point to *FAT* on other matters. After the war, during inquiries about the origins of the creeping barrage, nobody pointed back to *FAT*. Because the development was new and important, people hunted for its antecedents. Results were sparse: generals usually credited someone else, although acolytes sometimes attempted to reflect glory on their superiors by giving them the credit. ¹ If the concept had simply come from *FAT*, somebody would have mentioned it.



Dump of empty shell cases, Fricourt, September 1916. These are 18-pounder shell cases, the byproducts of creeping barrages and wire-cutting. Since they were made brass, they were recycled two to four times, which is why they were collected in dumps. During 1916 the BEF fired several million 18-pounder rounds, so these cases are only a tiny fraction of the total.

Source: IWM photo Q1471.

The principle of providing covering fire is an old one. An early example happened on the Somme, but in 1346 rather than 1916—Edward III's archers covered his troops fording the river. ² As an abstract principle, it was clearly understood by the Royal Artillery. Once the

infantry were close enough for the final charge (a few hundred yards), "artillery fire should become frequent and intense ... the object being to demoralize the defenders and reduce the volume and effect of their fire so as to afford to the infantry the opportunity to assault." ³ *FAT* added a few practical points and mentioned "searching the rear of the [enemy] position" once the infantry charged. ⁴ Crucially, however, it added that "no considerable amount of ammunition should be devoted to this object." ⁵ Creeping barrages require substantial amounts of ammunition, so this advice was clearly not advocating a 'creeper.' Henry Bethell went only so far as to recommend that the supporting batteries should increase their range when the friendly infantry were one hundred yards from the enemy position. ⁶

Furthermore, this sort of activity was not practiced, neither at the artillery firing camps, nor by the infantry, nor in combined maneuvers. Peacetime live-fire practice, especially of something as dangerous as a creeping barrage, would have been extraordinary (not least because any slip-up would have led to very difficult questions in Parliament), but if any real concept of the creeping barrage had existed it could have been represented with flags. The British army frequently used flags in training both before and during the war, and there would have been no more natural way to handle the concept that was used to represent a creeping barrage in wartime training. It should be said that no other army used a creeping barrage, and all had the same problem.

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Instead of a creeping barrage, the preferred method of artillery support was for a few batteries (as few as possible) to fire on the objective until the infantry got too close for safety, a method with which the army was comfortable. This method fitted well with the pre-war subdivision of divisions into brigade groups, pairing off infantry and artillery brigades. ⁷ Some called it affiliation, others attachment, and it is hard to find a difference, although during the war the meanings became firmer. For instance, in the 3rd Division, "Artillery brigades usually marched ... with the infantry brigade to which they were affiliated and under the orders of the Brigadiers of those brigades." ⁸

Even in the absence of any pre-war ideas of a covering barrage, the concept developed quickly. The infantry needed help, so the artillery did what it could. While the concept of the creeping barrage would arise in the span of only a few months, perfecting it took years. Eventually the infantry became so accustomed to a superb barrage they grew over-reliant, and artillerymen had to argue that the infantry should do more of their own work. This did not stop artillerymen from providing the splendid barrages for which the infantry clamored, but they saw how they were limiting success through the very means that made it possible. As conditions changed rapidly in 1918, gunners changed their tactics, this time without infantry objections, back toward the pre-war methods that had not been wrong in themselves, but were simply wrong for trench warfare.

1914

In 1914, the BEF fought as it had practiced, with short artillery preparations and virtually no covering fire for the last stages of the infantry assault. Frequently, since the Germans were in hastily constructed defenses or none at all, it worked. At the same time, options were few.

Battlefield communications were scanty, and battle situations were often too fluid for a creeping barrage to be organized. Even in 1918 it took eighteen to twenty-four hours to organize a barrage, and immediate counterattacks could not wait for a barrage. As an example, the Worcesters' famous counterattack at Gheluvelt on 31 October 1914—two hundred men plunging back into the battle and surprising the Germans, who retreated—could not have succeeded if there was a day's delay to arrange supporting fire. Although the British would have been better prepared, so would the Germans. Nor could the ludicrously small staffs of 1914 have organized a full barrage—CRAs lacked clerks, let alone staff officers. There were few options available beyond having a few batteries of 18-pounders fire as close ahead of the infantry as they could manage. ⁹

One sensible suggestion was made, combining advice from *FAT* and the tactical situation. In mid-September, John Headlam, CRA of the 5th Division, suggested that the infantry attack a key hill in the open so the gunners could watch their progress and keep the shells just a few yards ahead. ¹⁰ This was a common-sense suggestion from *FAT* rather than a stroke of genius on Headlam's part, but it made no difference. The infantry commanders brusquely discarded the idea, preferring to attack through woods that blocked Headlam's artillery from seeing their targets. The artillery fired a brief preliminary bombardment and then had to stop because it could not see where the friendly troops were. The attack failed. Headlam kept suggesting his plan, but beyond this instance there is no evidence of any kind of barrage ideas in 1914. ¹¹ There were extremely few set-piece attacks, and the late December attack on Messines Ridge apparently had no supporting fire at all.

1915

1915 saw the biggest development in infantry-support fire because it witnessed a conceptual change. Later years would see tremendous improvements in how a barrage was organized, but these were evolutionary. In 1915, a completely new idea sprung up; never again did a new idea spring up.

Things did not start dramatically. The first attack of the year was at Neuve Chapelle, and there was no barrage directly in front of the infantry. A bombardment pummeled the German trenches for a few minutes and then the guns switched to entirely different targets, neither lifting onto a second line of trenches nor lingering on the first while the infantry charged. There were good reasons for this. In this extremely flat region observation was difficult, and it would have been difficult to register on the German second defensive line. The German second line itself was exiguous; there were only a few strongpoints, and since they were not manned British intelligence had not detected them. Finally, while the process of registration of the front line was concealed by being spread over several weeks, registering points in the second line would have been very suspicious behavior and would have endangered the surprise that was important to the plan.

There was, however, a barrage of sorts used at Neuve Chapelle. It was a *barrage* in the literal sense of the word, a barrier, and it was fired about 1,000 yards away from the British trenches to delay the arrival of German reserves. Ammunition was scarce, and this barrage

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was not a high priority, but it may have mildly delayed the German reserves. The lack of the other sort of barrage, one on the German trenches just ahead of the infantry, did not lose the battle. The main problems in this encounter were command confusion about moving the reserves forward in the right-center sector (about which the artillery could do nothing) and a failure of the bombardment to hit the targets on the left. A creeping barrage would have helped, but would not have changed the results.

After Neuve Chapelle, the BEF debated where to attack next, and John Headlam again suggested attacking uphill in the open, to give gunners their best chance to 'walk' shells ahead of the infantry. ¹² This attack was never made, and Headlam gave up on this plan, but it was an intelligent method of dealing with the fluctuations of infantry combat: if one part of the attack was held up, the gunners covering that sector could see what was happening and adjust their fire, while successful infantry would not be held up by their neighbors. (It may have harked back to the Boer War, where guns could support the infantry better in the open than in close terrain. However, in that war new technology—field telephones—made it possible to control indirect artillery fire. ¹³) In World War I, no new technology arrived to allow equally detailed control of artillery fire. Plenty of ideas were tried to improve communications, but nothing was going to solve the problem until man-portable radios were developed. Wig-wag signaling had been largely discredited in the Boer War, runners were slow and vulnerable, wireless sets were bulky and fragile, and air observers had great difficulty telling muddy hostile infantry from muddy friendly infantry. (Photo Essay 1)

There was a second problem. If a commander had information that some infantry were held up, did he disrupt the whole attack plan to help them? It was easier to improvise in a small attack, but as attacks grew larger the complexities multiplied, and commanders decided that it was not worth disorganizing an entire corps attack because a single brigade or battalion was stopped. Headlam's solution was tailored to a small scale—it could only work in a few types of terrain (uphill) and for relatively small units. If the goal was to rupture the German line, his scheme was impractical. Quite likely, senior commanders recognized Headlam's method as a blind alley and avoided it, trusting that something better would turn up.

For several months there were no promising developments. The First Army wanted the artillery to "support the infantry during its attack" and shrapnel barrages to be "expanded as the infantry advances." However, this advice was tentative and referred to protective barrages rather than supporting ones. ¹⁴ (Protective barrages tried to block and/or disrupt German counterattacks and were fired beyond the British objectives.) Attacks at Aubers Ridge, Festubert, and along the Rue Vert featured bombardments (albeit totally inadequate ones) but no barrages. ¹⁵ None were more than marginally successful, and all were less successful than Neuve Chapelle. There was a new development in these battles, but an unwelcome one. Whereas at Neuve Chapelle the bombardment was fired at the same rate throughout, from Aubers Ridge onwards the artillery fired more intensely during the last few minutes before the infantry assault. Since the Germans were not, in fact, annihilated—nor had anyone expected they would be—all the rapid drumfire served to do was give them a final warning that Zero Hour was a few minutes away and they should be ready to leave their dugouts. It became more and more necessary to cover the infantry during their advance, not just to open

the way with a bombardment.

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In mid-summer, a new idea arrived in a small attack for some inconsequential railway tracks near Hooze. The 6th Division, of VI Corps, made a dawn attack on 16 June in an action too small even to warrant mention in the *Official History*. The artillery fired three lifts: from the front trench, to the support trench, and to some communications trenches. ¹⁶ As the name suggests, the artillery fire 'lifted' from one trench line straight to the next, and the plan was that this would happen just moments ahead of the arrival of the advancing British infantry. In some ways the barrage was simply a light repetition of the bombardment timed to take place just before the infantry assault, and thus compensate for its lightness by good timing. In other ways it was fundamentally different, being an effort to suppress rather than destroy. Despite the new technique the attack failed, probably due to the extremely light bombardment; the good idea still needed improved implementation. ¹⁷ At this point the lifting barrage was a unique idea, perhaps developed by W. L. H. Paget, Artillery Adviser of VI Corps, or G. Humphreys, CRA of the 6th Division. Neither left any papers nor had a distinguished career in the war. Whoever deserves the credit as the inventor, higher authorities adopted the idea was. The development should also be seen as a remarkably quick adjustment to trench warfare: the answer arrived just three months after Neuve Chapelle revealed the problem.

In the late summer, the BEF was preparing for its largest attack so far, the battle of Loos. Loos featured the most elaborate artillery plan to date, including the longest bombardment and further development of the 'lifting' barrage. The barrage had been identified as an aid to the infantry, and was not unique to the battle of Loos, although previous authors have noticed its use in the operations at Loos and missed the 6th Division's June attack altogether. Lifting barrages were used on the same day all along the British front, in different corps and armies. I and IV Corps' main attack at Loos used a lifting barrage, as did the diversionary or subsidiary attacks by III, V, and Indian Corps. ¹⁸ The details varied from place to place, and there is no letter or conference that can be identified as the inception of the barrage. The Meerut and 8th Divisions included 'creeps' (where the shelling swept over the ground between trench lines) as well as lifts (moving straight from trench to trench, skipping the intervening ground), so even here it is impossible to trace a single point of origin. Clearly someone at a high level—presumably GHQ, since both the First and Second Armies used the same method—had spotted the new idea and supported it. Whoever the patron was, there was no publicity, which emphasizes that it was a practical development rather than one requiring profound adjustment of the BEF's fighting style. The Second Army wrote to all its corps ordering a lifting barrage, while the First Army apparently achieved the same results verbally. ¹⁹

The father of the idea is still a mystery. VI Corps had no famous thinkers. The MGRA at GHQ, John du Cane, was an intelligent gunner but no great tactical innovator; he was also busier dealing with shell and gun supplies than with tactics. ²⁰ After the war, various gunners remembered what they had done at Loos, but nobody mentioned the other attacks that day or the June attack near Hooze, which rather devalues their testimony. ²¹ There is a slight possibility that the idea came from the French. ²² Unfortunately, there is no record of any visit where barrages were mentioned, nor mention in any British source of adopting a French

idea. French artillery thinking of the period was broadly parallel to British ideas, and in June a British translation of a French pamphlet spoke of artillery "increasing its range *progressively* in order to create ... a ... wall of fire under cover of which the infantry can advance." ²³ In the absence of a study of all French units, it is possible that the French thought of the lifting barrage first, but it appears unlikely that any French development directly led to the British creeping barrage.

A British pamphlet of late July built on June's results, using the term 'barrage' to describe an artillery tactic during the infantry advance rather than as a barrier. ²⁴ But at the time the BEF had to worry almost as much about the shell shortage as about the Germans. With that looming in everyone's mind, the General Staff warned against wasting shells on open ground. ²⁵ This was a strong reason to prefer a lifting barrage to a creeping one that covered every bit of ground: it used vastly fewer shells. As long as the Germans defended mainly from their trenches, the lifting barrage could be just as effective with less investment. There is no evidence of the idea being acquired from the Germans, who first used something similar in March 1916, but on the Eastern Front (some covering fire was also used at Verdun in late May 1916). ²⁶ However, both of these came several months after the BEF had used a prototype of a creeping barrage, and it does not seem that either side felt it had a secret weapon. In all likelihood it was a sensible idea that developed independently to help solve universal tactical difficulties facing all armies on all fronts.

There were drawbacks with lifting barrages, and indeed with any barrage controlled by timetable. It was not possible to bring more fire to bear on a strongpoint that held out, so resistance would ripple through an attack as the infantry lost their protection and support. First one unit would be held up, then it could not pressure the Germans, so more Germans fired into the flanks of other British units. Those units slowed down and the barrage got ahead of them (they "lost the barrage" in the terminology of the day), and ultimately a whole attack could be stopped, or at least a German salient would survive that flanked the newly gained ground and made counterattacks easier.

Ideally, reports of local troubles would be passed back, and the artillery would deal with the problem. But in World War I tactical communications usually failed. Telephone cable could not be buried deep enough to survive heavy shelling, and that shelling not only slowed or stopped runners but kept signalers from standing up and using flags or lamps. By 1917, special radio sets and earth-conducting telephones could convey some information but were bulky, temperamental, and vulnerable to interception.

Timetabling was unavoidable, although the ultimate solution was flexible infantry tactics so that the infantry could fight their way forward if the barrage did not do all the work for them. Some provision was made for the inevitable trouble spots. ²⁷ The infantry had to request a re-bombardment from corps, which then switched guns from other tasks. The difficulties can be imagined: word had to get from battalion to brigade, through division, to corps, which then had to organize the requisite artillery batteries and pass orders. The artillery then had to hit the target. The process was complicated and prone to breakdown (or at least serious delays) at any stage, and the only short-cut that could be made was to specify that all such re-

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bombardments would last for 30 minutes, with the last five being intense. This last point was a double-edged sword, for while it served to warn the British infantry when the bombardment was due to end, it warned the Germans as well.

The battle of Loos was intended to create a breakthrough, and the BEF did not neglect planning for the anticipated exploitation. Field artillery would revert from corps to divisional command when the German lines were broken, which was optimistically expected to happen eighty minutes after Zero Hour. ²⁸ From that point the artillery would operate much as it had in 1914. Heavy artillery would remain under corps control, advancing when needed and once routes had been prepared. The planners had spent time on exploitation planning but had not calculated what to do if there was no breakthrough; there was certainly no idea of organizing barrages to support repeated attacks grinding slowly forward. In the event, the Germans lost their first trenches, but there was never an opportunity to put the exploitation plans to the test. After the battle, the lesson was plain that centralized control was necessary for the set-piece battle—the carefully choreographed breakthrough—but affiliation must return when the fighting "becomes indiscriminate" during the pursuit. ²⁹ Given contemporary communications problems, this was not unreasonable.

1916

Based on the experience of one single day—25 September (at Loos and elsewhere)—the BEF continued developing the barrage to support and protect the infantry for the 1916 campaign. For an organization supposedly so hide-bound and slow to react as the BEF, this is impressive. Intelligent deductions and modifications were made instantly. The First Army grasped the essence of the barrage: "The great object to be obtained [during the assault] is to prevent the enemy from manning his trenches.... A sudden 'lift' of all artillery fire is objectionable, as it informs the enemy when the assault is to take place ... and batteries should 'lift' a short distance at a time." ³⁰ At the same time, the First Army also warned against a real creeping barrage because of the heavy ammunition expenditure, which was more of a concern in 1915 than 1916. Apparently some of these details were forgotten in the shake-up of BEF command six weeks later, because Haig as commander in chief had different priorities than Haig as commander of the First Army.

Just as the subsidiary attacks beyond Loos had featured lifting barrages, the subsidiary attack on 1 July 1916 used the same sort of barrages as the main attack. The BEF had firmly adopted the barrage, and it would come to be used by all armies and corps. There is no evidence of any discussions about an army-wide barrage during the planning of the Battle of the Somme, certainly not to the extent of the argument about the preliminary bombardment. ³¹ (A substantial article on this point is available as [Appendix 41](#).) However, while there was to be a barrage everywhere, the details were left to local commanders. Rawlinson simply told his corps commanders "the guns must 'arrose' [apparently meaning to shell] each objective just before the infantry assault it." ³² The one uniform point was that the barrage's timing was based on the infantry's pace: the lifts were timed to take place just before the infantry arrived at the given German trench, if everything went according to schedule. Most corps used a lifting barrage on 1 July because they expected the Germans to be fighting from the trenches.

(If the Germans were in their trenches, there was no point in shelling open ground between the trenches.) British objectives were also defined in terms of German trench lines, and using these lines to define the artillery's task simplified planning. Reflecting the greatly increased complexity of such a large battle and the inexperience of many divisions, the first barrage maps were issued. Previously there had been bombardment maps, but this was the first graphical representation of a barrage. ³³

Several corps barrages had a creeping element that was created to deal with unexpected resistance or undetected positions. ³⁴ Instead of lifting straight from one German trench to another, these "raked" or "drifted" across the intervening ground. While the Fourth Army clearly told each corps to provide some sort of barrage, the corps varied in their approach, even within themselves. Different divisions issued different artillery orders, and these orders differed in ways beyond the extent of men searching for clear words to express a relatively new idea. For instance, in XV Corps, the 7th Division ordered the artillery to lift at a rate of fifty yards per minute, while the 21st Division contented themselves by merely having the barrage "gradually drift forwards." ³⁵ This laissez-faire attitude is in sharp contrast to the general trend in the BEF. In many respects, by this point divisions were becoming cogs in the machine, corps were increasingly gaining authority over their divisions, and armies were shuffling subordinate formations around. This centralizing trend was especially true for the artillery, so it is remarkable that so much latitude was left to individual divisions regarding the barrage. ³⁶

Many elements of the barrage on 1 July were the same as at Loos. Re-bombardments followed exactly the same pattern: half an hour of shelling with the last five minutes more intense. Again a breakthrough was expected, and this time the cavalry were ready to exploit it. They kept their own horse artillery batteries, and a few 4.5-inch howitzer batteries were also allocated to them. These guns fired during the bombardment, but they were specifically ordered not to fire on 1 July so they would stay fresh and be ready to advance. ³⁷ During the bombardment before Z Day, there were even tricks played to mislead the Germans about the infantry assault. Every day, an intense 80-minute field artillery bombardment was fired, and the lifting/creeping barrages were practiced. On Z Day the field artillery bombardment was to be 65 minutes, in hopes that the German infantry would stay in their dugouts an extra 15 minutes, which would provide ample time for the attacking troops. As we know, this stratagem failed, and it was very nearly the last time an intense bombardment—signaling to both sides an impending attack—was used. ³⁸

The development of the creeping barrage proper was one of the main tactical features of the Battle of the Somme. It was not a smooth process, but blind alleys were few and only concerned small details. By the end of the fighting, the BEF had developed the creeping barrage to a high level.

In the first few days after 1 July there were few creeping barrages. This was probably not intentional, and there are several explanations. First, as Prior and Wilson have shown, there were very few large attacks in the two weeks following 1 July. ³⁹ Small attacks, organized by a single division, were less likely to employ creeping or lifting barrages. These were quite

complicated, and a divisional artillery commander would be overwhelmed trying to plan the bombardment, co-ordinate with the infantry, and create protective barrages, let alone implement a creeping barrage. Corps became the echelon for organizing creeping barrages, largely because divisions already had too much to do. Second, the attacks in this period were generally hastily organized. It took eighteen to twenty-four hours to organize a creeping barrage in 1918, when everybody had plenty of experience; organizing one in mid-1916 could easily have taken two days or more. Third, the number of guns a division commanded would not have been enough for a useful creeping barrage. At this point a division seldom commanded more than its own field artillery, 50-70 guns. ⁴⁰ Subtracting those guns broken from over-use, creeping barrages would not have enough weight to be effective. This was another reason for corps to organize creeping barrages, because they could order other divisions' artillery to cover an attack. As the Somme fighting went on, divisional artillery gradually was divorced from the infantry, spending longer periods on the Somme than the infantry. The standard allocation of divisional artillery was more than a division needed in defense, yet was an amount still too weak to cover an attack. During the winter of 1916-17 some field artillery brigades were withdrawn from divisions and designated as Army Field Artillery, which provided a reserve of field artillery for offensives.

Despite these difficulties, there were several attacks made using a creeping barrage. ⁴¹ The large attack of 14 July had only a sketchy barrage. Oddly, XIII Corps (which had a good barrage on 1 July) made no plans for one, while XV Corps had improved their barrages. ⁴²

The experience of just two weeks was enough for GHQ. On 16 July a memo spread the new gospel:

One of the outstanding artillery lessons of the recent fighting has been the great assistance afforded by a well-directed field-artillery barrage maintained close in front of the advancing infantry. It is beyond dispute that on several occasions where the field artillery has made a considerable 'lift,' that is to say has outstripped the infantry advance, the enemy has been able to man his parapets with rifles and machine guns. It is therefore of first importance that in all cases ... the field artillery barrage ... should not uncover the first objective until the infantry are close up to it (even within 50 or 60 yards). ⁴³

This was repeated in *Tactical Lessons of the Recent Operations* and was ceaselessly reiterated until the end of the war, although the repetition does suggest that the point was not always taken. ⁴⁴ Barrages were a vital part of the infantry attack, and thus were placed at the center of operations. Once tanks had appeared on the scene they drew considerable enthusiasm, but GHQ reminded the armies that tanks are "entirely accessory to the ordinary methods of attack, i.e., to the advance of infantry in close cooperation with artillery." ⁴⁵ Tanks themselves required the aid of a barrage, reminding the BEF which of the two was the more important element. ⁴⁶ Haig himself was interested in the new tactic, repeatedly jotting in his diary the minute details of successful creeping barrages. ⁴⁷

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New Zealand artillerymen loading limbers with ammunition, near Albert, September 1916. Every shell that was fired in World War I was handled many times on its way to the front, requiring a tremendous amount of labor, and usually many loadings and unloadings. This is one of the last stages: loading the limbers that will go forward to the gun positions, where the shells will be unloaded close to the guns. The white crosses on the end of each round are cloth handles that were secured by light metal clips; they simply made it easier to pull the rounds out of the limbers and generally made them easier to handle.

Source: IWM photo Q1249.

While GHQ was proselytizing, the troops on the Somme were busy improving the creeping barrage. ⁴⁸ By late September the terminology had finally been settled and a general rule existed about the number of guns required. One 18-pounder was needed per twenty-five yards of attack frontage; 4.5-inch howitzers were automatically in proportion, because a division had one-third as many. This was broadly in line with contemporary French practice (one 75mm gun per twenty-five meters), but when German defenses were stronger, more guns had to be used. In August 1916, Haig noted using a gun per twenty yards, and the standard for 1917 would become one per fifteen yards. On the other hand, weaker German resistance allowed the BEF to use fewer guns. For attacks on key strongpoints, the Fourth Army judged that one gun per ten yards was necessary, but against an ordinary stretch of trenches one per seventeen yards was adequate. ⁴⁹

Various methods were tried to obtain the best results, although it would be too much to call these experiments because there were too many variables and there was no spirit of experimentation with men's lives on the line. Some 18-pounders might search ahead of the main barrage, or fire a mixture of a lifting barrage and a creeping one, with some guns lifting and the rest creeping. ⁵⁰ The barrage might begin in front of the first German trench if the Germans were suspected of moving forward to avoid the barrage. ⁵¹ Once there was an attempt at surprise, with the creeping barrage starting three minutes after the infantry attacked. This was extremely dangerous and clearly unpopular, because it was not repeated until August 1918, by which time the circumstances were very different. ⁵² During pauses in the infantry's advance, the barrage might sweep back and forth to disconcert the German infantry and disrupt counter-attacks.

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The pace of the barrage was always a cause of concern: if it moved forward too fast, the infantry would be left exposed to the German trench garrisons, and if it was too slow then German reserves moved up and counter-attacks were organized. Haig frequently urged a faster pace because he was diagnosing a decline in German morale, but occasionally even 'thrusters' like Hubert Gough wanted the advance of the barrage slowed down. ⁵³ From the artillery's point of view, the question boiled down to increments and frequency: how long each step of the barrage was to be and how frequent those steps were. The artillery was not particularly involved in setting the pace of the barrage, which was set by the unit commander, who listened more to his infantry than the artillery. For some time there were arguments about 50 versus 100-yard lifts, and the artillery strongly preferred 100 as it halved the number of adjustments for gunlayers and fuse-setters (and should therefore have halved the number of mistakes they made). Eventually this became standard, if still subject to local alterations for specific purposes.

While the 18-pounders were firing the creeping barrage, the field and heavy howitzers would also support the attack. The 4.5-inch howitzers would typically fire a lifting barrage a trench ahead of the creeper and also rake along communications trenches. Heavier howitzers would fire still further ahead, targeting strongpoints, headquarters, and other key targets. There was seldom any difficulty in organizing this sort of support, and the infantry rarely complained about it. They did complain loudly, however, if the 18-pounders were shooting short, and the absence of complaints about larger guns suggests they stayed far enough ahead of the infantry.

One of the great problems of the creeping barrage was that it had to go by timetable. As explained above, this meant that a local delay could ripple through an entire attack. It was virtually impossible to control artillery support through observers, so there had to be other ways to fix problems with the timetable. At first there were efforts made to send artillery liaison officers along with attacking infantry units (sometimes brigades, sometimes battalions) and give the liaison officer authority to make changes in the barrage. ⁵⁴ While well-intentioned, this negated the larger plans and could make the ripple worse rather than better. In order to give the infantry the control they craved over their own support, another path was taken. Division commanders could switch some 18-pounders to help a checked battalion, but since these guns were already firing somewhere else it meant robbing Peter to

pay Paul. The Reserve Army spotted the problem and devised what would later be called "superimposition," where some guns would fire to thicken the barrage beyond the normal amount but would also be available to transfer their fire where it was needed. Because they were surplus to the normal density of the barrage, when they were switched elsewhere they did not reduce the fire density to below the prescribed norms. This idea was presumably either Gough's own, or that of Walter Strong (who was temporarily MGRA at the Reserve Army), although neither man is usually hailed as an innovator. ⁵⁵ In 1916, with the BEF still short of artillery, there was little that could be done about this and the measure survived, and indeed was broadened so that an infantry brigade commander could call upon a battery of 18-pounders and a division commander had a battery of 6-inch howitzers. ⁵⁶

As the Battle of the Somme went on, efforts to use artillery 'on call' increased. Ground-based communications ranged from difficult to impossible, so the RFC lent a hand. "Contact Patrols" tried to find both what the infantry had captured and where they were checked. Distinguishing friendly troops from enemies when both were muddy and lurking in shell-holes was a difficult business, and not surprisingly many times infantry were cruelly shelled by their own guns, or indeed from both sides. For the pilots to recognize them, the infantry had to lay out cloth panels, which were then visible to foe and friend alike. Still, during the Somme battles aerial co-operation improved considerably. Previously aircraft had mainly worked in quiet sectors, adjusting fire in bombardments of fixed targets. On the Somme the RFC developed the system of "zone calls," which allowed much faster reaction—fast enough to deal with moving targets or tactical situations such as a counter-attack. ⁵⁷ Reconnaissance work also improved, bombing got better, and artillery spotting became more proficient.

Over the winter of 1916-17, the BEF absorbed the lessons of the Somme campaign. Most infantry divisions had fought under a creeping barrage, and about half the corps had organized one. These units therefore had some experience with the creeping barrage, but to standardize procedures and also to help the inexperienced units still coming out from Britain the new batch of SS pamphlets had much to say about barrages, from their purpose through planning to execution. According to *Artillery in Offensive Operations* (available as Appendix 20), "the support of the infantry during the attack is at least as important" as the bombardment. ⁵⁸ The main purpose of field artillery was now barrages, a change that ratified the withdrawal of 18-pounders from bombardments. They were still used in harassing fire, especially at night, but even the previous practice of sneaking individual guns up to blast a particular strongpoint with direct fire was largely dropped in 1917. Artillery was, as always, an aid to the infantry: "The barrage has two main properties: (a) it is a man-killing agent; (b) it acts as a screen to cover the movements of the infantry from view." Finally there was a cautionary note:

The barrage system has been lately developed. It must be remembered that, while the following notes deal with the procedure that has recently been the most successful, it is only to be expected that the enemy will devise new methods to defeat our barrage fire. New methods on his part will call for immediate modifications in our artillery tactics.

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60-pounder firing a barrage, near Moeuvres, dawn of 27 September 1918. After 1916, one of the main uses of 60-pounders was adding depth to the creeping barrage. With greater range than the 18-pounders, the 60-pounders could hit specific targets ahead of the main barrage, to suppress them, restrict the movement of German reserves, or destroy particular targets. On the right horizon a field battery is moving forward, likely to become a direct-support battery or take up an advanced position to fire a later stage of the creeping barrage, something that was possible in 1918 but would have been suicidal in 1917.

Source: IWM photo Q9333.

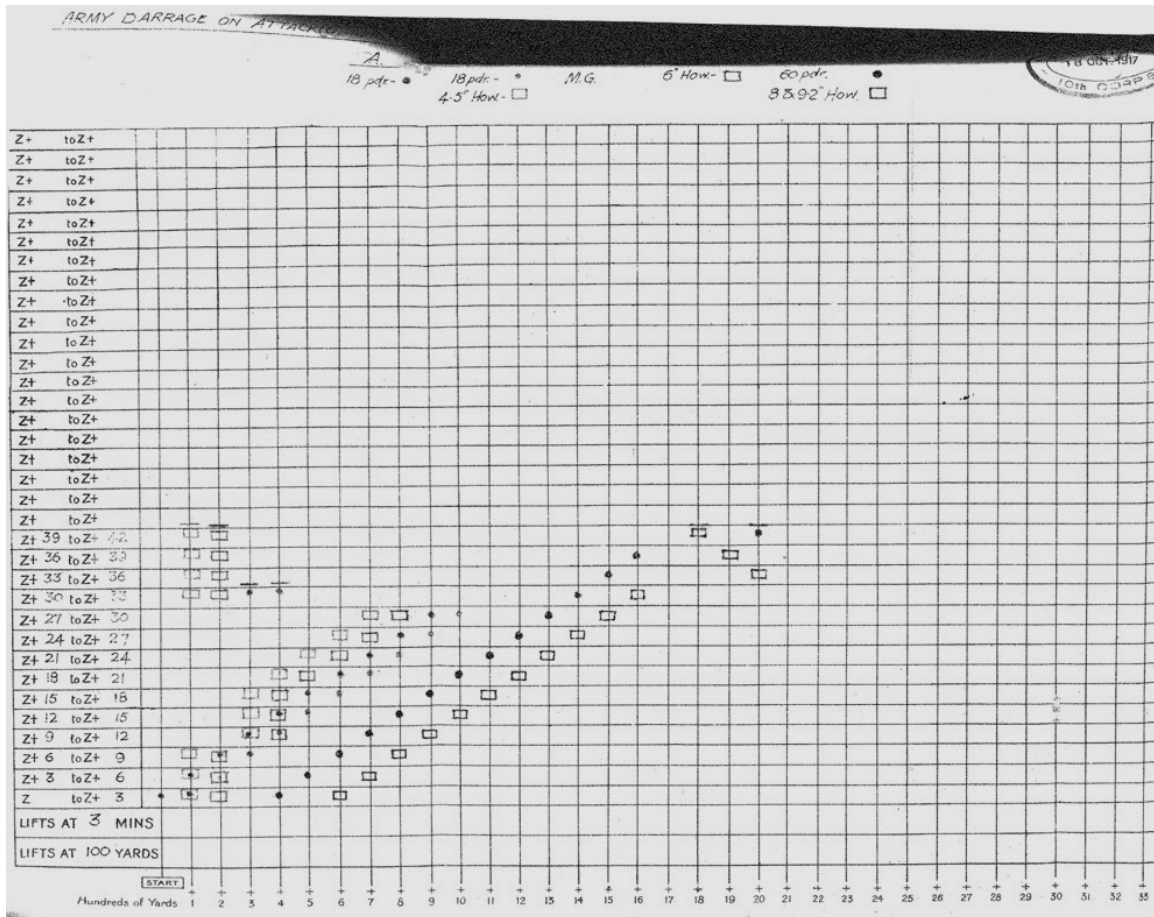
Not just tactics were reviewed; technical details were also spelled out, with advice given on all varieties of barrages and ammunition. ⁵⁹ Meanwhile, the gunners reflected on how best they could support attacks. Charles Budworth, MGRA of the Fourth Army, drew on his months of experience at the center of the Somme campaign for some lessons:

During the Battle of the Somme, generally speaking the "Infantry has been required to conform its movements to those of the Artillery barrage." This is right practically, nevertheless, theoretically the "Artillery barrage should conform to the movements of the Infantry." ⁶⁰

Budworth clearly adhered to the pre-war conventions on which arm was decisive and which was supporting.

1917

Already during the Somme fighting the Germans had altered their defensive tactics, and more changes were to come in 1917. As the Germans relied more upon defense-in-depth and less on a strong front line, the importance of bombardment declined and that of the barrage rose because there were fewer high-value targets (especially near the front) but many more low-value ones. Two pieces of new technology improved barrages. There was also a small return to direct fire support, but only in exceptional circumstances.



Barrage Planning Diagram. This is a planning tool used in the Second Army during the Passchendaele campaign. This shows a short preliminary barrage that would have been used to inflict some losses on the Germans and test coordination and planning on the British side. Not only is the barrage short, but in order to inflict more casualties on frontline infantry, after it started to creep back into the German rear, it suddenly moved forward again for the final few minutes. By showing all the types of fire at once—two bands of 18-pounders, 4.5-inch howitzers, machine-guns (which were not firing in this practice barrage), 6-inch howitzers, 60-pounders, 8-inch and 9.2-inch howitzers—it allowed planners to graphically record all fire and see at a glance what was intended. In the original, colors were used to differentiate the elements of the barrage, but this image has been scanned from a black and white copy.

Source: WO95/865.

In February and March, the Germans caught the Allies napping by withdrawing to the Hindenburg Line, leaving only rear guards to delay the Allied advance. With their customary tactical skill the Germans extracted the maximum of delay with the minimum of troops, holding woods and villages until the situation got too hot, which was typically when the Allies brought forward a few guns. ⁶¹ It was seldom necessary to develop a full bombardment and barrage, and the Fourth Army reported to the rest of the BEF how appropriate Field Service Regulations and *Field Artillery Training* were for mobile warfare. ⁶² Besides the usefulness of having a few 18-pounders forward to deal with isolated strongpoints, the second lesson concerned the effect of even a few heavy pieces. These were

disproportionately effective because of the morale effect of a large shell upon an isolated rear-guard, which generally chose discretion over valor.



Smoke screen, near Peronne, 5 September 1918. This smoke screen is just starting, and is apparently intended to block German observation or machine-gun fire from the low hills in the distance. By 1918 there was greater flexibility in using artillery to deny the Germans a position, either by shelling the position so that machine-guns or observation posts could not function properly, or to create a smokescreen for the same purposes. Both options reflected a greater confidence in the British infantry's ability to fight with support, instead of having the artillery conquer and the infantry occupy.

Source: IWM photo E3191.

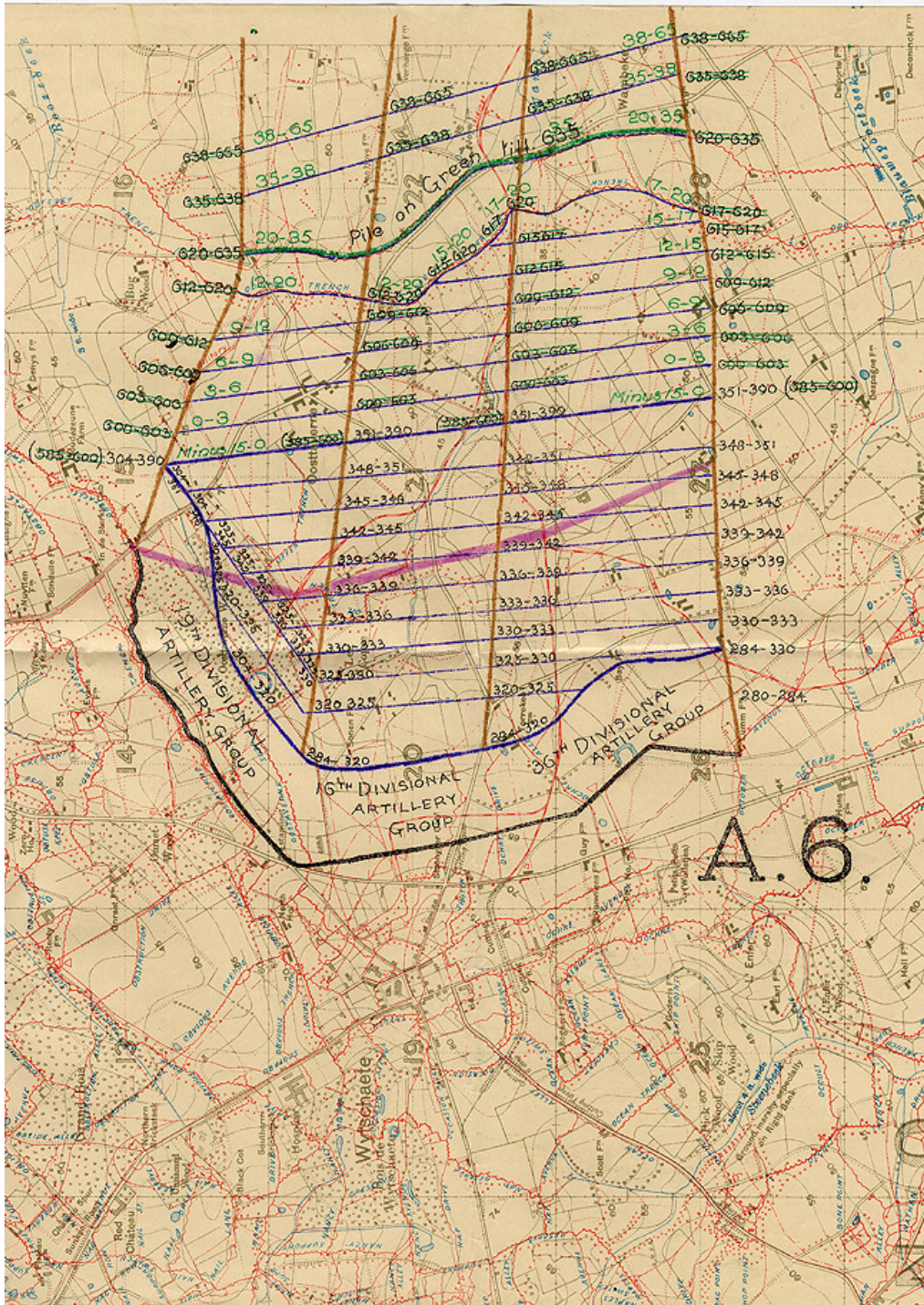
Back in trench warfare, the Germans developed a new tactic. They fired machine-guns at long range, safely beyond the British barrage. There were three obvious answers, all quickly deduced, passed up and down the chain of command, and implemented. First, the 'back' or protective barrage (fired to protect the infantry at their objective) could sweep further back than hitherto. ⁶³ This would chase the German machine-gunners out of range. Second, the whole creeping barrage could be conducted in more depth than before. Instead of three lines of shells (two from 18-pounders and one from 4.5-inch howitzers), a whole range of guns could be added. ⁶⁴ The obvious advantages of this idea led it to be rapidly adopted by all echelons of command, including Haig himself. ⁶⁵ Thus 60-pounders were mixed in, more heavy howitzers and, for the first time, machine-guns firing over the heads of advancing infantry. By October 1917 there might be as many as seven belts of fire in a creeping barrage, covering one thousand yards of the battlefield at any moment. ⁶⁶ Each of these belts could independently move back and forth so that the German infantry would never know when it was safe to come up and man their positions.

The third technique for defeating deep machine-gun placements was to obscure their view. Ordinary shrapnel shells produced a bit of smoke, but in 1917 smoke shells were introduced. ⁶⁷ Techniques for using smoke shells were disseminated long before there were enough such shells for widespread use (April 1917), but they were not accepted with particular grace. Despite official prohibition, the 9th (Scottish) Division used smoke in a creeping barrage. ⁶⁸ After the division's spectacular success on 9 April (the best single penetration of German trenches between 1914 and Cambrai), there were questions from above about what had worked so well. When the truth came to light about the 9th Division ignoring guidelines, the guidelines were changed. ⁶⁹ Within a week smoke shells were reserved for special operations where they could make the most difference. ⁷⁰

An organizational change also led to improvements in the creeping barrage. In 1916 the CRA of an attacking division commanded all the field artillery supporting that division. While this meant unity of command, it was exercised directly from the CRA to the brigades, so that a single CRA tried to control perhaps ten to twelve brigades of artillery. In 1917, artillery brigades were slightly larger, so the same number of guns represented fewer units. Even more importantly, the brigades were grouped. Brigades operated in pairs or even threes, reducing the amount of work for the single divisional staff, and also freeing a brigade commander for liaison with the infantry. Thus one brigade commander would handle the artillery while the other worked with the infantry. ⁷¹ This is further evidence of the care the artillery took to help the infantry. Another option that presented itself thanks to the improved staff work and infantry fighting skill was varying the barrages. A creeping barrage might go a certain distance (perhaps two thousand yards), then the artillery would shift to firing concentrations on specific targets (perhaps key strongpoints or a ridgeline), with the infantry fighting around the artillery fire. ⁷² This recognized the improved tactical skills (and increasing firepower) of the infantry, which could now fight on its own rather than feeling it could only follow a line of shells.

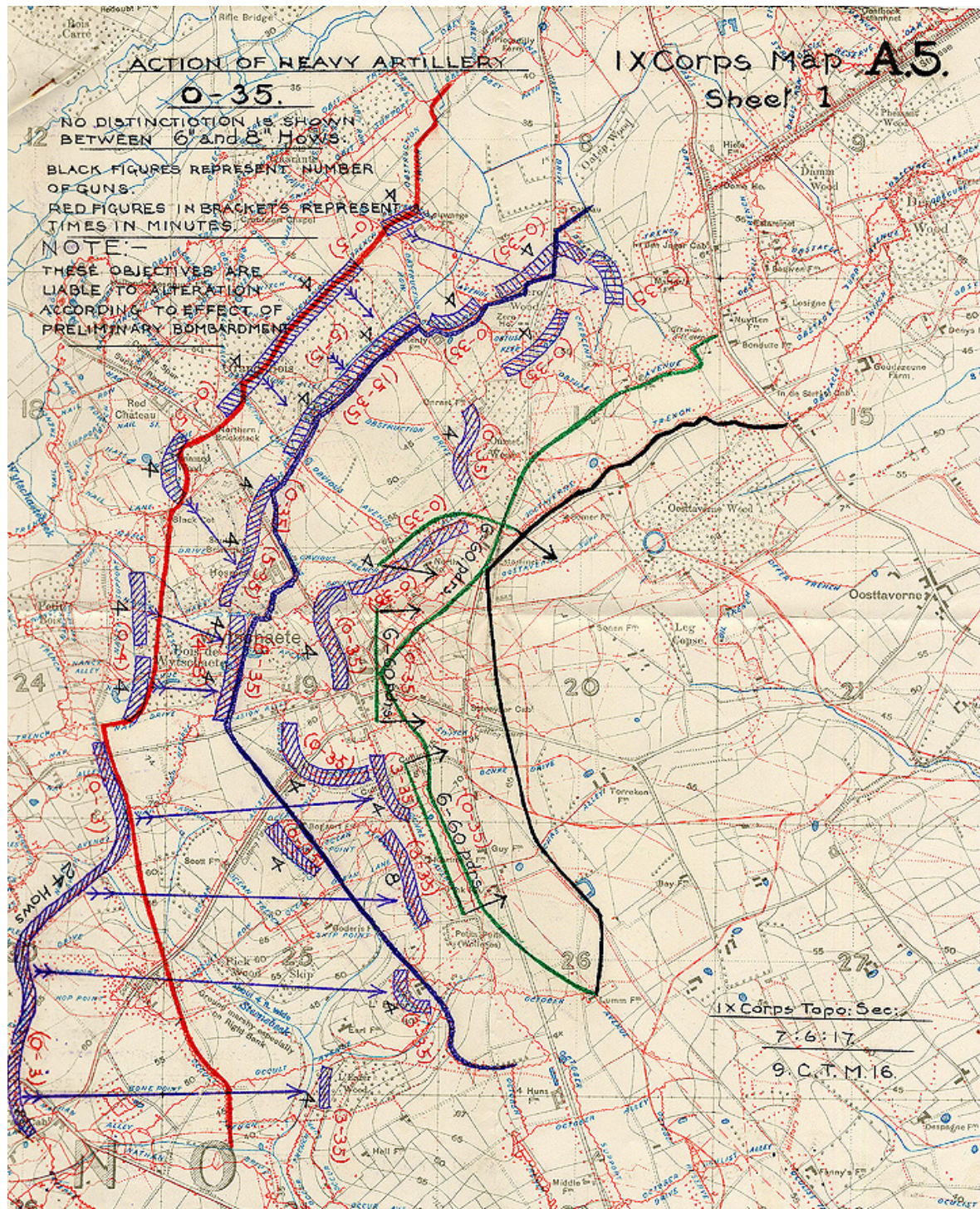
As mentioned above, in 1917 the relative importance of bombardments and barrages changed. In 1916, despite the famous bombardment at the Somme, there were not really enough guns to effectively deal with large sectors of the German line. In 1917 there were: new batteries were still deploying from Britain, and new equipment was arriving to improve the effectiveness of troops already in the field. ⁷³ More and better guns fired more and better shells; the Germans saw what was coming and abandoned linear defenses. They put more emphasis on counter-attacks, delivered as soon as the British infantry halted or even while they still advanced. ⁷⁴ Strongpoints became bases for maneuver and rallying points rather than places to be held to the last man. Thus there were fewer good targets for the British bombardment, yet more targets overall. But old habits die hard. The British infantry wanted the German trench network smashed before an attack, and it took several months of 1917 before these requests changed. Now the German trenches were seen as positions that could be captured and then used to defend against German counterattacks, and the Royal Artillery was told to switch more effort from bombardments to creeping barrages. Because they had abandoned the trenches, the German infantry were moving and fighting above ground (or at most in shellholes), and thus made excellent targets for the barrage. ⁷⁵ This became more pronounced as the year went on. At Arras, the creeping barrage was only somewhat better than in 1916, because the Germans in that sector were slow to adopt the new defensive tactics

and so there was less urgency in improving the barrage. At Messines, the limited objective meant the bombardment was more important, but the British still developed the barrage. (Photo Essay 2 has some photos of practice barrages at Messines. This animation shows the barrage in front of one of the divisions attacking at Messines. Map 1 is the static version of the animated map. Map 2 and Map 3 show the development of the barrage in addition to the field artillery's creeping barrage.) Once their defenses were smashed and the ridge captured by the British, the Germans saw how events were developing and did not waste troops counter-attacking in circumstances where British artillery would have slaughtered their infantry. Similarly, in the fighting for Hill 70, when the Germans launched counter-attacks the Canadians mauled them with massive artillery support. This was an intelligent application of fire and movement, but in a way not foreseen in *FSR*.

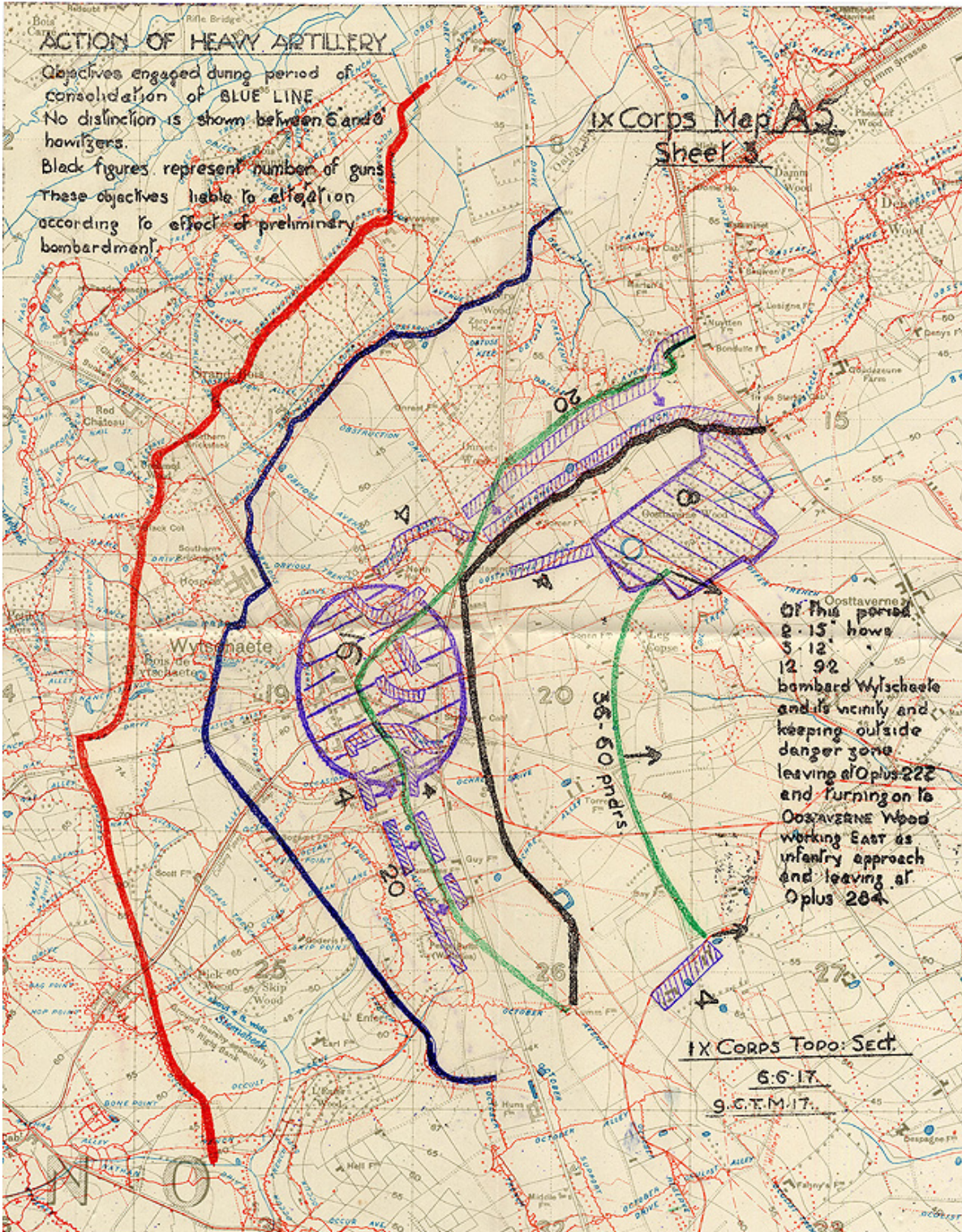


Map 1. Planning map for a creeping barrage, Messines Ridge area, June 1917. This map shows the creeping barrage planned for IX Corps (see [Map 4](#)) at Messines Ridge. Maps like this would have been distributed to every field artillery brigade involved in the operation.

Source: Rawlins Papers, RAI.



Map 2. Planning map for heavy howitzer barrage, Messines Ridge area, 7 June 1917. Ahead of a creeping barrage, medium and heavy howitzers laid down a lifting barrage. This map shows the planning of such a lifting barrage and how deep a barrage went by mid-1917. A map for the previous day is exactly the same. This barrage was fired on the day of the attack, but the previous day an identical barrage was fired to soften the Germans up even more than the preliminary bombardment, to inflict casualties, to test British preparations, and to confuse the Germans about when the attack was actually going to be launched. Source: Rawlins Papers, RAI.



Map 3. Planning map for heavy artillery barrage, Messines Ridge area, 6 June 1917. Compared with Map 2, this shows another band of heavy artillery fire, even deeper into German lines. In addition to bands of fire that extended the creeping barrage up to seven hundred yards deep, heavy artillery fired one or two bands of fire further into the German lines. The shelling shown on this map was intended to be a final touch on any German defenses in Wyschaete village and to block reinforcements from moving forward.

During the Passchendaele campaign, the creeping barrage reached a pinnacle of development. ⁷⁶ Several times during the campaign the BEF thoroughly bombarded the German defenses. In between these attacks they fought battles, with the artillery mainly firing counter-battery missions and barrages. Indeed, at times creeping barrages were so heavy that some officers speculated that a heavy barrage could replace the bombardment. ⁷⁷ The strategic plan was to break through the German lines, which meant that the infantry quickly had to advance deep into the German positions and the barrage had to be stretched to unprecedented distances. This failed because the objectives were beyond field artillery range, and heavy artillery was technically unsuitable for a creeping barrage. Because of the larger lethal radii of heavy artillery shells (e.g., 200 yards for a 6-inch shell), the infantry had to stay well behind the barrage and the Germans had time, after the barrage had passed and before the British infantry could arrive, to get out of their shelters and open fire. ⁷⁸ Using heavy artillery for the barrage also took it away from counter-battery work, so the German artillery was free to do more damage. Optimistically, the Fifth Army had prepared plans for artillery support during the breakthrough phase; divisions were to advance their field artillery, and also would be allotted some heavy artillery beginning at H+490 minutes. ⁷⁹ But the Fifth Army never got close to a breakthrough, and Haig handed responsibility for the offensive to the Second Army.

Once the Second Army took over the main effort, they realized that barrages had to be organized as never before ([Appendix 23](#)). The Fifth Army had been less advanced, even wondering whether division commanders could control their own creeping barrage, reversing corps control and probably ignoring their neighbors. ⁸⁰ Some things, like using diagrams to help planning, were simple ways to improve performance. But the Second Army backed that up with a determination to use enough artillery to do the job. The creeping barrage became a weapon in its own right, not just support for the infantry. Sweeping back and forth, varying the timing from day to day, the barrage probably killed as many Germans before an attack as it suppressed during one. Practice barrages—normal since June 1916—were organized to lure the Germans to assemble counter-attacks in certain areas, and those areas were then shelled during the attack. ⁸¹ The heavy barrages were also good for the morale of British infantry. Neil Fraser-Tytler, an artillery brigade commander, vividly described the infantry "fairly out for blood, and after seeing the practice barrages ... there was some confidence flying about." ⁸² Areas were regularly left out of the practice barrages to lure the Germans in, then shelled during the actual attack. The Second Army also developed the "prisoner barrage," which was exceptionally dense and fired on three sides of a rectangle. It was then pulled towards the British lines, leaving German infantrymen the choice of surrendering or taking appalling risks from shellfire. ⁸³

With the German fixed defenses shattered by the weeks of bombardment, the barrages sweeping back and forth across the landscape broke down the last element of German resistance, their defensive organization. The many small defensive positions were swept by the various belts of the creeping barrage, and the counterattacks had to penetrate the same

walls of fire before they even got to the British infantry. By the end of the second phase of the battle the Germans had to abandon defense-in-depth, returning to sheer weight of numbers in a forward defensive line.⁸⁴ But this made even more men vulnerable to British shellfire, and in the end it was only bad weather that stopped the BEF. This is not to underplay the significance of the bad weather: appalling for the infantry, it was only marginally better for the artillerymen. Guns sank into the morass, living conditions were dire, and the Germans did everything they could to make life more dangerous. A German shell fired at random into the Ypres Salient was likely to hit something, and the use of mustard gas made harassing fire that much more terrible. The artillerymen stuck it out—their principle was to continue firing their guns as long as their infantry were in the open or under attack, regardless of the weight of German fire. Haig watched the success of British tactics with subdued delight, blandly noting that "our tactical methods have defeated those of the enemy," but unfortunately turned a blind eye to the toll exacted from the BEF.⁸⁵ His eyes were fixed on the number of German divisions rotated through Flanders, but he seems never to have noticed that the same thing was happening to the infantry of the BEF.



14th Battery Royal Australian Field Artillery, near Ypres, 1917. The sheer physical work required of the artillery was tremendous. To cover an attack with a creeping barrage, these 18-pounder guns would fire two to four shells (twenty-two pounds per round, including cartridge and propellant) per minute, for fifty minutes of each hour (the guns needed to cool and have the sights checked), for up to six hours. Each fuze had to be set by hand, and the elevation had to be adjusted as the gun and air temperatures changed, and depending on the batch of propellant involved. **Source: IWM photo E920.**

Over the course of 1917 the details of creeping barrages became second nature to the field

artillery. The RFA had been relieved of most other duties (besides the creeping barrage, they only performed some wire-cutting and harassing fire), and constant practice improved skills and performance. Meanwhile, the infantry's calls for support grew and grew. Another indication that the infantry battle was again paramount was the declining importance of counter-battery fire, at least during attacks. After the prolonged preparations for a battle, German artillery had usually been mastered. Even when it was not, the creeping barrage was considered more important than counter-battery fire, and heavy artillery was switched into thickening the barrage, especially making it deeper. The circumstances of each British attack differed, and the artillerymen did their best to adjust the barrages to changing circumstances, such as the duration of the preliminary bombardment, depth of objectives, density of guns and troops, ground conditions, and a host of other considerations. It was truly a matter of orchestration by men who have earned their subsequent appellation of 'master gunners.'

The mammoth protection and support the creeping barrage gave to an infantry attack led to over-reliance. Ludendorff tartly wrote of 1917:

We must differ essentially ... from the attacks hitherto undertaken by the British. They believed in the efficacy of their skillfully worked out but rigid artillery barrage. This was to carry forward the infantry attack which advanced without any impetus of its own. The subordinate and, still more, the higher commanders, ceased to have any further influence. ⁸⁶

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While the infantry were improving their fighting skills from the nadir of 1916, they were still hesitant to stand on their own two feet. The BEF never quite believed that artillery conquered and infantry occupied, but a corps could write, "If the artillery plan is complete and the gunners are given full time to carry through ... the battle is three quarters won before our infantry appear on the scene at all." ⁸⁷ Enormous bombardment was no longer necessary to break into an ordinary trench position. Instead, the infantry could fight their way forward, using new weapons, and even more importantly, better small unit tactics. ⁸⁸ British infantry were of course learning about trench-warfare attacks rather than open-warfare infantry tactics. (The Germans similarly treated the two as separate, with different rules, and the Americans would shortly revile trench-warfare thinking but laud open warfare. ⁸⁹) Thus they were far better at fighting through trench lines with the barrage protecting them from counter-attacks than at out-fighting the counter-attackers. With the constant toll of casualties and stream of replacements, it was naturally difficult for the infantry to progress beyond a certain level of competence.

Given the proven efficacy of creeping barrages, it is no surprise that infantry and formation commanders insisted on plenty of artillery support. Even some officers with good reputations for progressive tactics among historians had lapses, such as Ivor Maxse, who wrote: "I hold the view that ground is gained by artillery, that ground is defended by artillery, that battles are won by artillery and that battles are lost by artillery." ⁹⁰ It was left to senior artillery commanders to remind the infantry that there was something beyond trench warfare. Frustration mounted with infantrymen who "thought a creeper and a heavy howitzer barrage 200 yards beyond would take them to Berlin." Birch's reaction was scathing and sarcastic. ⁹¹ Other artillerymen faced with the same mind-set were more philosophical, reminding

themselves that artillery was a supporting arm and everything it did was to facilitate the infantry closing with the enemy. Herbert Uniacke, fresh from directing the Fifth Army's artillery through a long year of battles, wrote a twenty-one-page report on artillery developments that year, reviewing various technical and tactical developments. He concluded by reminding readers of the ultimate purpose of the artillery's war: helping the infantry to "gain their objective with the minimum of loss—*always bearing in mind that the final decisive factor is the bayonet of the Infantry soldier.*" ⁹² Uniacke also pointed out the futility of infantry attacks across boggy ground, but phrased his arguments oddly. The artillery fired barrages at the rate the infantry asked, and so Uniacke's comment was that there was no point in attacking if the barrage would be slower than 100 yards in 6 minutes. If the infantry could not struggle forward any faster than that, the Germans would have plenty of time to reorganize or prepare a counterattack regardless of the strength of the British attack and barrage. Uniacke was complaining about attacking through horrendous mud, but doing so in a roundabout way. There was no doubt he would fire such a barrage if asked—during Passchendaele he did—but he pointed out that it was not sensible.

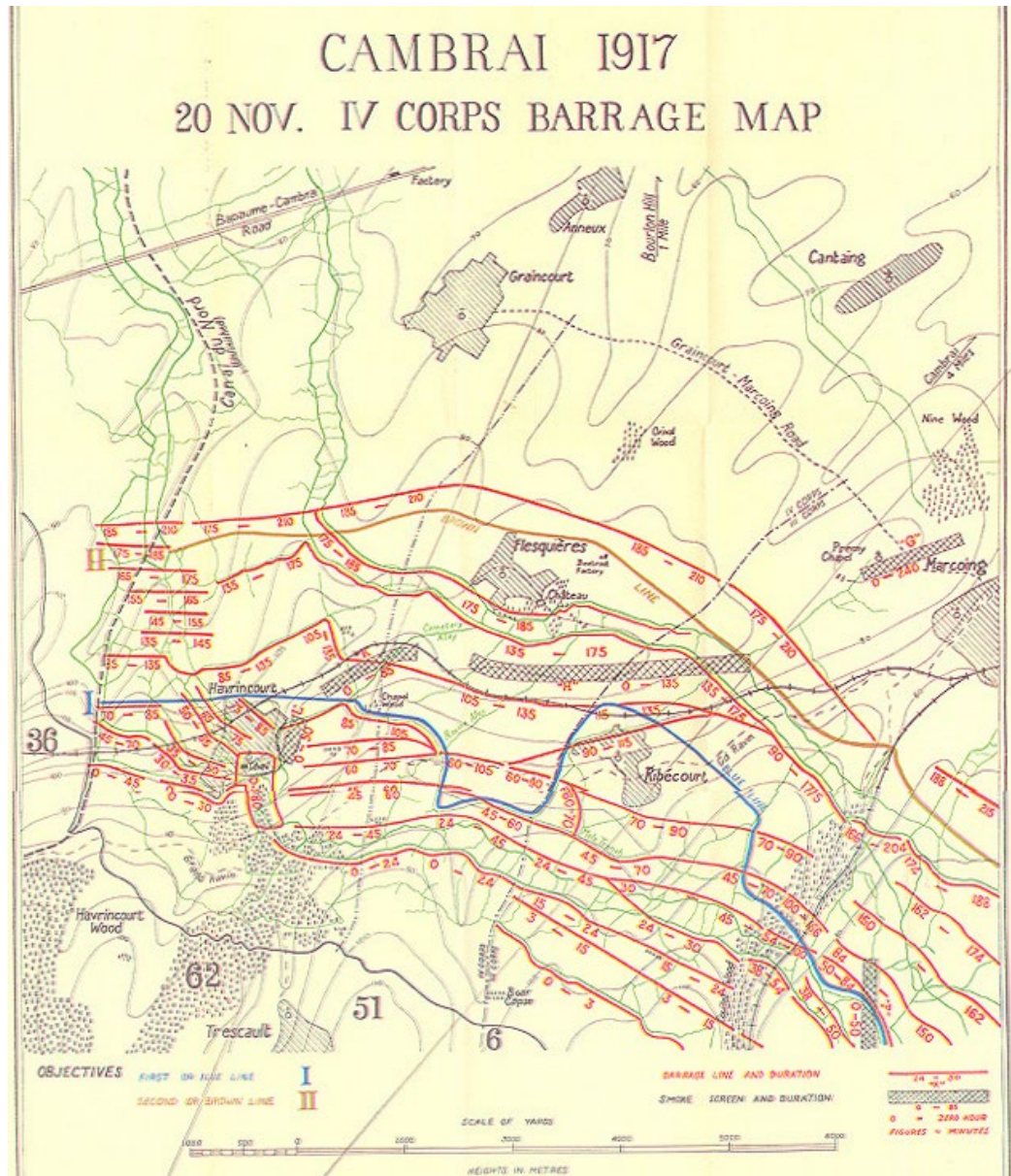
Perhaps some of the infantry obsession with barrages stemmed from the fact that they lost their 'own' batteries, the ones that brigade or division commanders could allot. These were replaced with guns under central control. ⁹³ These extra guns, up to a third of the barrage, were "superimposed," that is, supplementing the ordinary barrage until switched onto special targets. These targets might be centers of resistance, counter-attacks, or German guns that revealed themselves. The advantages of centralized control were two-fold. Information could come from any number of sources, including aeroplanes, balloons, artillery observers, or the infantry themselves. Previously it had been up to the infantry to request the support and, brutally, the infantry units that most needed support were least able to request it. Secondly, artillery was not wasted sitting still while waiting for a target to be reported, but was already thickening the barrage. ⁹⁴

The final battle of 1917 saw a considerably different barrage than had previously been used. At Cambrai, surprise was the key element. Since the surprised Germans had no time to man intermediate positions between the trench lines, a creeping barrage was unnecessary. Instead, the Third Army organized a lifting barrage that shelled each German trench in turn; this also generally kept the barrage a few yards further from the British infantry and the vulnerable tanks, which did not want to drive into the barrage. ⁹⁵ ([Map 9](#) shows part of the barrage at Cambrai.) Despite seeming to represent a step backwards, the barrage functioned smoothly and there were no complaints about the method.

Anticipating a breakthrough, steps were taken for artillery support beyond the barrage. A new method was devised, combining the pre-Somme plans for cavalry pursuit with the experience of the advance to the Hindenburg Line. Cavalry divisions would have their own horse artillery batteries and a few additional 4.5-inch howitzer batteries, but now these guns would take part in the initial barrage. ⁹⁶ The leading infantry divisions also received extra batteries, but of 6-inch howitzers and 60-pounder guns. ⁹⁷ These had shown adequate mobility and had been very useful during the advance to the Hindenburg Line, and they proved it again along the Canal du Nord. Large shells had considerable morale effects, and 'persuaded' isolated German groups to withdraw or surrender. But the breakthrough at Cambrai was illusory, the

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surprise temporary, and the battle dragged on with different artillery methods. Without surprise, and with the tanks broken down, ordinary artillery methods were needed. But as the guns advanced from pre-surveyed battery positions, they could not fire a predicted barrage. Typical 1917 conditions returned after a single morning's blip.



Map 9. V Corps barrage map, Cambrai, 20 November 1917. At Cambrai the BEF fired a lifting barrage that moved straight from target to target instead of sweeping all the ground in between lines, as a creeping barrage (MAP 1) did. The smoke barrages shown here were weather-dependent, but the weather was favorable on 20 November and they were fired. However, while they were effective for their duration, that duration had been miscalculated, and German anti-tank fire became effective.

Source: *OH 1917*, vol. 3.

1918

1918 began with the BEF on the defensive, and thus with little call for offensive barrages. During the desperate fighting to repel German attacks, organized barrages were few and far between. British counter-attacks were generally small affairs and artillery support—if any—was provided by a few guns firing either over open sights or at specific targets. The few relatively large counter-attacks were organizational nightmares, because the artillery was accustomed to the trench-warfare pace of planning. It had become so wrapped up in paperwork that there were forms to fill out for each gun in a barrage. ⁹⁸ In trench warfare, such preparation reduced the number of shells falling on friendly infantry (and thus reduced complaints), but there was no time to engage in such detailed planning for the counterattacks of 1918. Creeping barrages were time-consuming for planning staffs and also required many supporting elements that were rarely present in even semi-mobile warfare. ⁹⁹ They required vast quantities of ammunition, which was difficult to arrange for the right place and the right time when everything was moving—batteries, command posts, and ammunition resupply points alike. Communications were severely disrupted once the networks of buried cable that trench warfare both required and facilitated had been left behind. Commanders had to organize what support they could through runners, gallopers, and whatever telephone links were hastily laid. One officer tersely summed up: "the more [telephone] wire you give us the more Huns we shall kill." ¹⁰⁰

All this did not mean that counter-attacking infantry fought alone. If conditions were difficult for the British artillery, the Germans suffered too. Their communications were just as bad, and their supply situation was worse. Most importantly, they were not in strong defensive positions; if there were no trenches for them to defend, they became correspondingly vulnerable, and thus a weaker British barrage could have adequate results. World War I casualty figures are hard to pin down, but it was about as costly to defend as to attack. The German attacks of 1918 had the chance to win the war, but their failure ripped the heart out of the German infantry not only in morale but in sheer numbers.

Once there was a rough equilibrium on the Western Front, the BEF began making small attacks. These attacks varied, with some launched to seize strong positions, others to exploit weak ones. The bombardments correspondingly varied, but the barrages had less variation. The minor attacks were always heavily supported with dense barrages. The German infantry involved were often of poor quality, willing to surrender if they could find a reason, and the intense barrages provided an excuse to stay in their foxholes and surrender rather than fight. While they were heavy, barrages were pragmatic, adapting to local circumstances and using whatever pace and munitions (gasses, smoke, HE, and/or shrapnel) promised most effect. There was no BEF-wide formula. ¹⁰¹ In virtually all cases there was no exploitation of these minor attacks, so the Royal Artillery did not plan for batteries to exploit nor plan how to provide fire support in an advance.



Creeping barrage, near Meteren, 18 August 1918. The 9th (Scottish) Division made a limited attack on 18 August after heavy artillery preparation and under a dense creeping barrage. This photo shows what a dense creeping barrage looked like. The clouds are partly from smoke shell (25 percent of the barrage) and partly from dusty ground.

Source: IWM photo Q6990.

When it came to a major attack, with a goal of breaking through a main German line and exploiting through the hole, the situation was somewhat different. The organization was little altered—field artillery fired a creeping barrage, heavy artillery fired on more distant targets—but the barrages would be thinner, because on the broader fronts involved there were not enough guns to provide fire as dense as in the small attacks. GHQ warned the armies that the heavy concentrations so typical of 1917 could not be repeated and therefore the infantry would have to do more fighting themselves. ¹⁰² Also, when the goal was to move through the German lines rather than just occupy a portion of that line, the Royal Artillery had to support the exploiting troops. In 1917 this had been difficult since, to be safe from German guns, the field artillery had to be well behind the front lines and thus could not fire deep into German positions. The ruined landscapes also prevented artillery from advancing quickly and providing close support. In 1918, British attacks had the advantages of surprise or artillery superiority, or both. Barrage guns could therefore be placed further forward, providing deeper coverage right from the start. But even that was not enough once penetration of German lines was measured in miles instead of hundreds of yards.

Mobile artillery support was necessary, and it took several forms. Some artillery brigades would be earmarked to move forward early in a battle. Typically these would be the superimposed brigades, so the barrage was not weakened when they moved. Other brigades would then leapfrog forward, and the creeping barrage would be continuous. Although it would be continuous, after only a few minutes it thinned and became more ragged as batteries moved forward, got lost or were delayed, or ran low on ammunition, but the gamble of lessened support was worth taking because the Germans would be retreating. Sometimes the infantry's first objective would be the furthest line on which a full barrage could be fired, and thereafter mobile artillery was the only support. ¹⁰³ There were times when this was not enough support, especially for breakthrough forces like cavalry. Horse artillery batteries would be attached to forward regiments or brigades, but some artillery officers complained that even horse artillery batteries could not move fast enough. ¹⁰⁴ They also complained that the cavalry commanders had to coordinate with the artillery and machine-gun units, which shows how out of touch some cavalry officers were: they wanted to solve tactical problems on their own rather than using combined arms. It was a throwback to pre-war attitudes that had survived longer in the cavalry because the cavalry had seen less action than the infantry.

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Some infantry formations adopted similar steps, and in some cases a field battery would work with each infantry brigade, not plunging into the front line but staying close behind it and using observers and indirect fire. ¹⁰⁵ Sometimes this was still not enough to deal with local strongpoints, and a pair of guns would be attached to a battalion, fighting forward in the thick of things. ¹⁰⁶ For the times when close support was impossible, the guns simply ceased fire, creating shell-free areas where the infantry or cavalry used their own skills to advance, neither supported by artillery fire nor constrained by friendly fire. ¹⁰⁷ It was a remarkable demonstration of the BEF's confidence in the fighting qualities of the infantry.

Whenever the Germans occupied solid defensive positions, the BEF wisely paused and mounted a deliberate attack to break the position. ¹⁰⁸ This involved a bombardment and a full series of barrages, just as in 1917, to demoralize, weaken, and confuse the defenders. The difference came after the initial phase of such battles, after the main resistance had been broken. Now there was more chance of exploitation and less chance of major German counter-attacks, so artillery support was modified. Barrages were fired until the infantry cracked the German line, then the artillery fired concentrations on key terrain features to deny them to the Germans rather than to aid British capture. Infantry would operate around these points, using their own tactical sense rather than having to follow an even-paced barrage. This could be considered infiltration tactics, if indeed the BEF is to be credited with any.

More time was spent pursuing the Germans than turning them out of defensive lines, and trench-warfare tactics had to be adapted to suit the circumstances. Barrages were often very thin, as much guiding the infantry advance as protecting them. In this regard smoke shells or the few incendiary shells that were available were especially useful. ¹⁰⁹ Frequently there was little time to prepare detailed barrage maps, and the barrage would be fired parallel to some simple terrain feature such as a road, with the infantry conforming to the barrage rather than the reverse. Thin barrages were no problem with the Germans in weak positions; frequently

they were just resisting wherever they happened to have spent the night. Goaded by Haig, armies urged greater speed in the advance, complaining that the infantry relied too much on a barrage and not enough on their own weapons. ¹¹⁰ Some armies standardized their barrages so that corps and divisions could operate interchangeably and not waste time fine-tuning barrages when there was little to be gained from the extra effort. ¹¹¹ While infantry leapfrogged forward, field artillery was more continuously engaged, so there were usually at least two divisional artilleries backing each division in the line. This was no challenge for the CRAs, who had dealt with more field artillery in 1916 and 1917. However, in the mobile fighting of 1918, some heavy artillery was attached to most divisions. Generally each division got a "Mobile Brigade RGA" composed of two batteries of 6-inch howitzers and two batteries of 60-pounder guns. ¹¹² Corps might retain some authority over these guns, mostly regarding counter-battery work, but the bulk of the time the CRA was in control. ¹¹³ Thus the division was itself firing not only a creeping barrage but organizing the distant fire on specific targets that corps headquarters had previously handled.



Australian infantry attacking behind a creeping barrage, 18 September 1918. This rare photo of infantry in action shows how thin a creeping barrage could be. This barrage is probably doing more to show the Australians the right direction than it is to suppress German fire. The cloud in the left center is probably a recently-landed smoke round, while the smaller clouds are dust and the small puffs of smoke are ordinary rounds. The photo also shows another development: the infantry have enough fighting power to fight on their own, instead of relying on the creeping barrage to suppress most German resistance. **Source: IWM photo E3259.**

In addition to creeping barrages, the infantry regularly needed close support. Training over the previous winter had improved the artillery's standard of mobility, and the spring retreats gave practical experience in mobile warfare, even if it was in moving backwards. Training continued in the early summer, especially emphasizing mobile operations, so the field artillery was generally quite capable. There were still plenty of wartime volunteer officers who had no personal experience of what the lecturers (who were usually Regulars) tried to drum into them, so aggressive use of field guns was a patchy affair. ¹¹⁴ However sporadic, it was the right thing to be doing, and there were exhortations to read the relevant sections of *Field Artillery Training*. Uniacke, now Deputy Inspector General of Training and specifically responsible for artillery training, rushed out leaflets encouraging direct support, hoping that experience was more persuasive than *FAT's* theories. ¹¹⁵ Repeated printings of the leaflets, however, suggest the lessons were not reaching everyone. On the other hand, there were subalterns who blithely meandered across the battlefield with their guns, doing as they saw fit, ignoring and enraging infantry commanders. When heavy artillery was pushed forward, it seldom engaged over open sights and was generally better behaved, shooting where it was asked. ¹¹⁶ In the very last days of the war there was no need for barrages, and only minor need for much fire support at all. By October, barrages were a rarity in the Fourth Army, generally only going a few hundred yards and then giving way to close support batteries, including sections of 6-inch howitzers advancing as far forward as the 18-pounder batteries. ¹¹⁷ British spearheads were stretching the lines of supply to the breaking point, and artillery ammunition was declining on the list of priorities since the infantry did not need as much artillery support. Many batteries were put into reserve, which generally meant two things: the horses were taken away to help other units, and the men were put to work mending roads.

Throughout 1918, most senior officers recognized that three things could make the infantry's job easier. Air support, tanks, and artillery were supporting arms, sometimes referred to as auxiliaries. Aeroplanes depended on the weather and had only limited bomb loads; tanks were mechanically unreliable and constantly nagged the Royal Artillery for protection. At one point they even asked the gunners to deal with "all anti-tank devices," asking for more support than the infantry ever had. ¹¹⁸ Artillery was the most reliable and most powerful aid to the infantry, but it could not do everything. Intelligent commanders thought in terms of the supporting arms reducing infantry losses, a vital point to a diminishing BEF. Infantry brigades had been trimmed from four to three battalions at the beginning of the year, and the battalions were still not up to strength, even with callow youths and half-fit older men. Under the circumstances, commanders leaned on the artillery to do as much work for the infantry as possible. As Birch wrote, "All Army Commanders are at me not to reduce the Artillery and say with the present state of the infantry they cannot do with a gun less...." ¹¹⁹ This was quite true, but there were still limits on what artillery could do.

Taking for example the battle of Valenciennes just ten days before the Armistice, the Canadian Corps assembled perhaps the heaviest artillery support for any small attack in the war. ¹²⁰ After a punishing bombardment, the German lines were swept by barrages from all directions: frontal, enfilading, and even reverse barrages. Fire was calculated so that, theoretically, no German infantryman could survive. Naturally some did, and the infantry took roughly one-third casualties. ¹²¹ Losses were low in absolute terms—501 Canadians—but not in percentages. This was not an unusual figure for infantry losses in any war, so the

artillery was not necessarily reducing the rate of casualties. What artillery did was reduce the number of infantry needed, and by doing that it reduced the overall casualty numbers. Artillery fire could be used, for example, to deny the enemy a hill at a crucial time, rather than the infantry having to storm the hill. This sort of theory was, however, going far beyond what was being said in 1918. Most commanders simply used artillery as they had been taught to use it (if they had received formal instruction), or adapted intelligently.

Conclusion

Thus the use of barrages came nearly full circle in the war, back to providing close support by direct fire over open sights. Since simply bombarding before an attack and then switching to other targets proved fatally inadequate, barrages were developed to provide covering fire during the infantry assault. The success was obvious; attacks never failed due to a too-heavy supporting barrage. Details always varied to match local conditions, but the principle was never in doubt. As German tactics changed, so the barrage changed, to the point where a light bombardment and a heavy barrage would be indistinguishable. Increasing sophistication in infantry tactics, artillery tactics, and more importantly in combined-arms tactics allowed a shift back to concentrations of fire, away from a linear barrage. By the end of the war, tactics lifted from *Field Artillery Training* and *Field Service Regulations* reappeared, but with barrages available if they were needed.

What happened between 1914 and late 1918, however, was primarily a pragmatic adjustment. It was pragmatic in a way that bombardments were not, for while there was frequently pressure from high commanders to adjust bombardments to fit a strategic conception, there was vastly less pressure to adjust the pace of barrages. Two reasons can be advanced to partially explain this difference. Bombardments were the opening acts of major battles and planned at high levels. They were thus subject to intense pressure to fit with strategic objectives. On the other hand, barrages were planned one or two levels lower, and high-level intervention would have been inappropriate. Second, if there had been such intervention, lower-echelon commanders would have a sheaf of local detail to bolster their arguments. If we follow Tim Travers' arguments about the role of personality in British senior commanders, ¹²² the explanation is plausible that senior officers did not want to enter arguments with better-informed subordinates: the senior could easily lose the argument and thus face, even if they used their authority to override objections.

Throughout the war the artillery supported infantry attacks in every way possible. Artillery officers offered suggestions on better ways to conduct operations, but when there were conflicts they fell into line with the wishes of the troops who would ultimately be doing the fighting.

Notes:

Note 1: See the 1965 letters of H. H. Gardiner (RAI military document 509), whose enthusiasm led him to credit A. F. Brooke. Gardiner later retracted this claim, which seems to have been made without foundation. [Back](#).

Note 2: This was four days before the battle of Crecy, the first time an English army used gunpowder weapons in battle. A. F. Becke "The Coming of the Creeping Barrage," JRA 58:1 (1931): 19. Entire article is available as [Appendix 41](#). [Back](#).

Note 3: *FAT 1914* §157, ¶2. [Back](#).

Note 4: Ibid., ¶6. [Back](#).

Note 5: Ibid., ¶6. [Back](#).

Note 6: Bethell, *Modern Artillery in the Field*, 345, 139. [Back](#).

Note 7: Maxse Papers, file 11/2. [Back](#).

Note 8: WO95/1390, (3rd Division CRA), August 1914. This could have unforeseen effects, as for the 15 Brigade RFA, affiliated to the 14th Infantry Brigade during the retreat from Le Cateau. The infantry brigadier's orders had been not to retreat, which led the RA brigade commander to decline another officer's orders to retire. CAB45/198, C. F. Stevens to Edmonds, n. d. New Army divisions (like Maxse's 18th) could be trained this way too. [Back](#).

Note 9: 18-pounders were preferred for barrages all through the war, very largely because they fired shrapnel. In 1914, *FAT* steered gunners towards 18-pounders by suggesting that more firepower should be generated by an increased rate of fire rather than an increased number of pieces firing. Guns with fixed ammunition can fire faster than separate-loading howitzers, like the 4.5-inch. [Back](#).

Note 10: 15 September 1914, WO95/1521 (5th Division CRA). [Back](#).

Note 11: WO95/1510 (5th Division GS) 26 December 1914; WO95/1521, 16 January 1915. [Back](#).

Note 12: WO158/200 (Second Army Plans), 18 February 1915. [Back](#).

Note 13: Buller's fighting around Hlangwane featured what I believe is the first battlefield use of telephones to direct artillery fire. [Back](#).

Note 14: "General Principles for the Attack," 13 April 1915, WO95/155; available as [Appendix 7](#). [Back](#).

Note 15: Prior and Wilson, *Command on the Western Front*, 77-99. [Back](#).

Note 16: WO95/1581 (6th Division GS), WO95/1588 (6th Division CRA). This may well not be the first example of a lifting barrage; I stumbled across the orders while doing a survey of three infantry divisions' CRA war diaries. While I read all corps-level artillery files, I read only three CRA war diaries: 6th Division, 9th (Scottish) Division, and 41st Division. [Back](#).

Note 17: Ibid. [Back](#).

Note 18: *OH 1915*, vol. 2, 454, 467; WO95/1683 (8th Division CRA diary), BX/25 c. 20 September 1915; WO95/3934 (Meerut Division CRA diary) "Scheme C," 23 September 1915; WO95/88 (No. 2 HARG) V Corps GX2568, 14 September 1915; WO95/1881 (14th Division CRA), 25 September 1915. [Back](#).

Note 19: Second Army MGRA letter EL1, 12 September 1915, WO95/745. [Back](#).

Note 20: He was next sent to the Ministry of Munitions before returning to corps command in 1916 to 1918, something he did with competence but little flair. [Back](#).

Note 21: E.g., R. S. Hardman, who credits Horne with the creeper and E. W. Alexander with the details (CAB45/116, 30 March 1930), while Alexander (CAB45/137) credits C. E. D. Budworth. Headlam credited the French, entirely omitting his own earlier ideas about attacking in the open. Headlam to Rawlins, 26 January 1919, Rawlins Papers. [Back](#).

Note 22: Becke ("Creeping Barrage," 24) suggests the French were not using a *barrage mobile* at the opening of the battle of the Somme, but the French XX Corps in August 1915 were ordering their artillery to "lengthen its range, little by little ... so as to form a barrage in front of the assaulting troops." It does not appear to have been uniform practice in the French army. Third Army War Diary, 25 August 1915, WO95/359. [Back](#).

Note 23: CDS24, "Object and Conditions of Combined Offensive Action," June 1915; emphasis in original. Whatever GQG said, there is no good evidence the French were using a creeping barrage. See Maxse Papers, IWM, file 23 for comments on French supporting fire on the Somme. [Back](#).

Note 24: CDS50, "Tactical Notes," 31 July 1915. [Back](#).

Note 25: See also *OH 1915*, vol. 2, 173, n. 4. [Back](#).

Note 26: Becke, "Creeping Barrage," 24. [Back](#).

Note 27: *OH 1915*, vol. 2, 467. [Back](#).

Note 28: *OH 1915*, vol. 2, 454-5, 467. [Back](#).

Note 29: Maxse Papers, IWM, file 15, conference notes, 13 October 1915. [Back](#).

Note 30: "Some Artillery Lessons to be learnt from the Recent Operations in September-

October 1915," Advanced First Army, 7 November 1915, Rawlinson Papers, NAM. The suggestions were repeated by field-grade officers at a 'college' or symposium, but were issued with the express disclaimer "These notes are not official," rather than as an SS pamphlet. WO33/756, "Notes on Artillery," June 1916. [Back](#).

Note 31: On barrages on the opening day of the Somme, see Becke, "Creeping Barrage," for an excellent exposition. Becke's work, within the limits he set himself, is definitive. [Back](#).

Note 32: Fourth Army operations papers vol. 4, conference 16 April 1916. Fourth Army GX3/1P, 5 June 1916; Fourth Army operations papers,. vol. 7. [Back](#).

Note 33: The first standardized system for marking bombardment maps seems to have been laid down in November 1916 (SS133, untitled). There must have been some rough-and-ready system previously in existence, or else co-operation would have been even worse than it was. [Back](#).

Note 34: One source enthusiastically claimed that III Corps had developed the creeper "to a fine art" before 1 July. Perhaps, but III Corps fared badly. H. W. L. Waller to Edmonds, 18 April 1930, CAB45/138. VIII Corps also crept back, at precisely the pace expected of the infantry advance, which proved too sanguine and sanguinary. WO158/410. [Back](#).

Note 35: Becke, "Creeping Barrage," 29-30. [Back](#).

Note 36: E.g. Budworth's "Remarks based on Recent IVth Corps Artillery Operations," 6 October 1915, which flatly declared, "The Artillery plan ... should be a Corps Artillery plan." This was picked up by Archibald Montgomery in his "Lecture on Battle of Loos" (n. d., but early December 1915), but less so by Rawlinson in "Artillery Lessons of Loos" (9 October 1915). All are in the Montgomery-Massingberd Papers, LHC, files 6/4 and 7/1. [Back](#).

Note 37: GHQ to Reserve Army, 4 June 1916, WO158/245. [Back](#).

Note 38: As best as can be determined, the first formal denunciation of intense fire was in Fourth Army 32/3/98(G), 16 August 1916, (Fourth Army Operations Papers, volume 7), which forbade intensification or slackening of fire at Zero. See also *OH 1916*, vol. 2, 567. [Back](#).

Note 39: Prior and Wilson, *Command on the Western Front*, 203-26. [Back](#).

Note 40: Divisional artillery establishment varied between New Army, Regular, and Territorial Force divisions. See Sir Martin Farndale, *History of the Royal Regiment of Artillery, Western Front 1914-18* (Woolwich: The Royal Artillery Institution, 1986), 348-9. [Back](#).

Note 41: Becke, "Creeping Barrage," 35-6. [Back](#).

Note 42: Ibid., 37. [Back.](#)

Note 43: OA256, 16 July 1916, quoted in Becke, "Creeping Barrage," 38. [Back.](#)

Note 44: SS119, July 1916. [Back.](#)

Note 45: OAD169, 5 October 1916, in Haig Diary. [Back.](#)

Note 46: Fourth Army Papers, vol. 5 "... Tactical Employment of Tanks (Provisional)," August 1916. See XIV Corps BGRA (WO95/915) 12-15 September 1916, for how the two arms first co-ordinated. [Back.](#)

Note 47: E.g. Haig Diary, 4, 5, and 20 August 1916. [Back.](#)

Note 48: An example would be following the details through the Maxse Papers, IWM, files 17-27. [Back.](#)

Note 49: Maxse Papers, IWM, file 23, contains details of French practice in October 1916. Haig Diary, 20 August 1916. Letter 305/2(G), 30 December 1916, Fourth Army to GHQ (Fourth Army Operations Papers, volume 21). [Back.](#)

Note 50: *OH 1916*, vol. 2, 295, n. 2. Developments took place at different times in different corps. II Corps performed their first multi-line creeping barrage in late October, while V Corps was very sophisticated shortly after joining the Reserve Army. II Corps BGRA WO95/651, 18 October 1916; V Corps BGRA WO95/756, October 1916. [Back.](#)

Note 51: *OH 1916*, vol. 2, 395, 479. [Back.](#)

Note 52: *OH 1918*, vol. 4, 197. [Back.](#)

Note 53: Haig Diary, 8 October 1916; letter, GA43/0/4, 16 September 1916, WO158/344. [Back.](#)

Note 54: E.g. the 8th Division's "Instructions for Artillery ... in Liaison with Infantry," 25 June 1916, WO95/1684. [Back.](#)

Note 55: GA15/0/1, 14 July 1916, WO158/344. [Back.](#)

Note 56: Only very occasionally was a reserve of guns held, as in XIII Corps. *OH 1916*, vol. 1, 158. 18th Division Operations Order 66, 27 October 1916, Maxse Papers, IWM, file 64;

WO158/419. A battery of 6-inch howitzers was standard, at least in XIV Corps, by the end of September 1916. Sometimes the CRA controlled the 4.5-inch howitzers as well, with only 18-pounders firing the barrage; *ibid.*, XIV Corps Artillery Operations Order 18, 11 September 1916, WO158/419. [Back.](#)

Note 57: SS120, "... Co-operation between Aeroplanes and Artillery During an Advance," September 1916; and SS124, "Notes for Artillery Officers on Shoots with Aeroplane Observation" (August 1916). [Back.](#)

Note 58: SS139/4, February 1917 and later reprints. [Back.](#)

Note 59: GHQ Artillery Circular No. 5, "Technical Notes on 18pr Barrages," 26 March 1917 (Headlam Papers). Presumably this represented a codifying of ideas already incorporated in the Arras barrages rather than last minute alterations. [Back.](#)

Note 60: "Artillery Notes and Statistics, Battle of the Somme, June to November 1916," November 1916, Rawlinson Papers, NAM. [Back.](#)

Note 61: See WO95/432, 30 March 1917 for details. [Back.](#)

Note 62: SS156 (April 1917), "Notes on Recent Operations, Compiled by GS Fourth Army." [Back.](#)

Note 63: In early 1917, the protective barrage might be only three to four hundred yards beyond the objective. Third Army Artillery Instruction 13, 19 April 1917, WO158/312; WO106/399, "Canadian Corps Artillery Instructions for Vimy." [Back.](#)

Note 64: The Second Army noticed this in January 1917, predicting the German tactic before it was sprung on the British and long before the Second Army could have experienced it. WO158/18, 30 January 1917. The 18th Division had suggested it on 12 September 1916. 18th Division AB/[none], Canadian Corps BGRA diary WO95/1059. [Back.](#)

Note 65: Haig Diary, 12 May 1917. Haig pressed his army commanders to deepen and think through their barrages at a conference on 30 April 1917: OAD426, Fourth Army operations papers, vol. 21. The Third Army had hints of a deeper creeping barrage two days before this, and on the 30th it ordered smoke barrages to blind machineguns and a protective barrage five hundred to one thousand yards beyond the furthest objectives. Third Army Artillery Instructions 16, 17; WO158/312. [Back.](#)

Note 66: For full details, Second Army G140, "General Principles on which the Artillery plan will be drawn," 29 August 1917, WO158/208. [Back.](#)

Note 67: There had been smoke bombs for 4-inch Newton mortars since the battle of Loos, but the range of these mortars was too limited to allow them much effect in large battles. The

Fourth Army suggested smoke shells for artillery in October 1916; presumably this helped encourage production. WO95/431, 13 October 1916. [Back](#).

Note 68: The excuse was the "alignment of enemy trenches." Sir Hugh Tudor Diary, RAI military document 1167 (hereafter Tudor Diary). The *OH* gracefully glides over the situation; see *OH 1917*, vol. 1, 227, n. 2. [Back](#).

Note 69: Tudor Diary. Tudor claimed XVII Corps suppressed the report when they saw that it would get them in trouble, but the XVII Corps diary puts a different 'spin' on the question; WO95/942, 16-19 April 1917. [Back](#).

Note 70: OAD402 (Army Commanders' Conference, 16 April 1917); smoke was to be used to blind a valley between two attacks. Fourth Army operations papers, vol. 21. [Back](#).

Note 71: Sometimes there was further division of the artillery, with a division forming two artillery groups, one supporting each infantry brigade. CAB45/118, C. A. L. Brownlow to Edmonds, "Notes on Cambrai," n. d.; CAB45/116, C. G. Stewart to Edmonds, n. d.. [Back](#).

Note 72: The 15th Division did this after their first objective at Arras; the 37th Division (nominally an exploiting division) did so after the third objective. Field-Marshal Sir John Dill Papers, LHC, files 1/3/1-2. [Back](#).

Note 73: See I. V. Hogg and L. F. Thurston, *British Artillery Weapons & Ammunition 1914-1918* (London: Ian Allen, 1972) for the improvements in artillery equipment. [Back](#).

Note 74: On German defensive tactics see G. C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber & Faber, 1940); and Timothy Lupfer, <http://www-cgsc.army.mil/carl/CSIPUBS/Lupfer/lupfer1.htm>. Deeper barrages also forced counter-attacks to assemble further back, and the assembly areas would also be shelled. Birch to Hunter-Weston, 4 May 1917, Anstey Papers. [Back](#).

Note 75: Steps did have to be taken against counter-attacks, for instance detailing aeroplanes with a direct call to some batteries to watch for assembling German troops. GHQ OA715, 1 May 1917, WO95/363. [Back](#).

Note 76: The Fifth Army's barrages in September-October can be traced in WO158/250 (operations correspondence with GHQ); V Corps' are found in WO95/756. [Back](#).

Note 77: Hugh Tudor thought the battle of the Menin Road Ridge could be fought immediately after barrages, with a bombardment superfluous. Tudor Diary, September 1917. [Back](#).

Note 78: However, see *OH 1917*, vol. 2, 71. [Back](#).

Note 79: Maxse Papers, IWM, file 33. [Back](#).

Note 80: XIV Corps BGRA WO95/916, 12 August 1917. [Back.](#)

Note 81: Fifth Army GA43/0/4, 16 September 1916. [Back.](#)

Note 82: Neil Fraser-Tyler, *Field Guns in France: With a howitzer battery in the battles of the Somme, Arras, Messines & Passchendaele 1915-1918* (Brighton: Tom Donovan, 1995), 181. [Back.](#)

Note 83: See V Corps, WO95/756, 16 September 1917, and for Second Army methods in general. [Back.](#)

Note 84: The Fifth Army was modifying its artillery tactics as fast as, or faster than, the Germans. See Uniacke's "Attack Barrages, as modified by the enemy's latest tactics," (RA225, 25 August 1917, Maxse Papers, IWM, file 35/3); and Rawlins, *History*, 141-5, 152-6. [Back.](#)

Note 85: Haig Diary, 7 October 1917. [Back.](#)

Note 86: Historical Sub-Section, General Staff, American Expeditionary Force, *A Survey of German Tactics, 1918* (Washington, DC: Government Printing Office, 1918). [Back.](#)

Note 87: II Corps G1266, 19 September 1916, WO158/344. [Back.](#)

Note 88: See, e.g., Byng's GS50 (10 August 1917; WO158/311), and the constant calls for improved marksmanship. [Back.](#)

Note 89: *Die Angriff im Stellungskrieg*, translated as SS748 "The Attack in Position Warfare," October 1918. On American tactics, see James W. Rainey, "The Questionable Training of the AEF in World War I," *Parameters* 13:3 (1983) 34-46; and "Ambivalent Doctrine: The Tactical Doctrine of the AEF in World War I," *Parameters* 22:4. 22:4 (1992), 89-103. [Back.](#)

Note 90: XVIII Corps GS69 to Fifth Army, 12 August 1918, Maxse Papers, IWM, file 35/4. [Back.](#)

Note 91: Anstey galley proofs, 140: "This is my aunt," if Anstey has not bowdlerized the comments. [Back.](#)

Note 92: Uniacke papers, VII/2; emphasis in original. [Back.](#)

Note 93: Guns allotted to divisions survived as late as Messines, with each division having two 18-pounder batteries, and a battery each of 4.5-inch and 6-inch howitzers. One

interesting transitional feature of Messines was having a few heavy guns per division that would deepen the barrage where locally necessary. WO158/413 [Back](#).

Note 94: SS131 details RFC co-operation and also reflects better command links. [Back](#).

Note 95: CAB45/137, T. A. Tancred to Edmonds, 3 April c.1935. Tancred was BGRA of III Corps at Cambrai. [Back](#).

Note 96: The 4.5-inch batteries even received extra horses to improve their mobility. A horse shortage had developed by early 1917, and the RHA were the only units to retain their pre-war horse strength and hence mobility. [Back](#).

Note 97: *OH 1917*, vol. 3, 29. [Back](#).

Note 98: Army Form W3981, "Barrage Table for No_ Gun," which was filled out for each gun; RAI military document 1348. [Back](#).

Note 99: One corps could prepare a creeper in nineteen hours by August; during the battle of Villers-Bretonneaux (April), estimates were around twenty-four hours. F. Fitzgibbon to Edmonds, 16 October 1938, CAB45/185; *OH 1918*, vol. 2, 397. [Back](#).

Note 100: WO158/343. [Back](#).

Note 101: Compare the attacks at Meteren and Hamel; *OH 1918*, vol. 3, 200-11. [Back](#).

Note 102: OAD291/33/1, 11 June 1918; G. P. Dawnay Papers, IWM. Here Haig's words to his army commanders were prepared by the artillerymen; the draft is in S. W. H. Rawlins' handwriting. Rawlins Papers, file 11, 9 June 1918, available as [Appendix 42](#). [Back](#).

Note 103: E.g. Fourth Army 220(G), 21 July 1918. Fourth Army operations papers, vol. 49. [Back](#).

Note 104: Cavalry Corps, "Notes on Recent Operations No. 5," 24 August 1918; Fourth Army operations papers, vol. 65. [Back](#).

Note 105: Some were urged on by senior commanders, like Rawlinson: "We are now engaged in open warfare when the fire of guns—both Field and Heavy—has to be directed largely from direct observation and on the initiative of subordinate Commanders." Fourth Army GS20/14(G), 27 August 1918; Fourth Army operations papers, vol. 49 [Back](#).

Note 106: Canadian Corps had an elegant plan whereby each battalion worked with one battery. Four guns would operate as a unit with indirect fire while the remaining section

provided direct fire support. "Artillery Notes on Attack by Canadian Corps, August 8th 1918," WO95/1060. [Back.](#)

Note 107: Fourth Army 20/36(G), WO158/242, 7 October 1918; II Corps BGRA, 22 September 1918, WO95/653. [Back.](#)

Note 108: At least one division warned its advanced guard not to attack bald-headed but let the CRA organize proper support. The advanced guard had an 18-pounder battery, and the "vanguard battalion" only two guns, whilst the CRA had four brigades of field artillery and a brigade of heavy artillery. Staff College Syndicate Report 1927/7, "Battle of the Selle." The Fourth Army issued a similar warning to corps in October: WO95/439, 23 October 1918. [Back.](#)

Note 109: III Corps Narrative, 18 September 1918-11 November 1918, Fourth Army operations papers, vol. 63 (henceforth III Corps Narrative). Incendiary shells had been tried several times and found wanting in ordinary circumstances. There was little enough to set alight in most 'woods' on the Western Front. [Back.](#)

Note 110: Haig Diary, Army Commanders' Conference, 11 June 1918. [Back.](#)

Note 111: For the Fourth Army, see Montgomery-Massingberd Papers, files 7/25 and 7/28, or III Corps BGRA WO95/694, 20 August and 12 September 1918; Fifth Army Artillery Instruction No. 120, 7 November 1918, WO158/254. [Back.](#)

Note 112: The Third Army specifically warned against attaching too much heavy artillery. WO95/372, 30 August 1918. [Back.](#)

Note 113: This worked much better when the division had a heavy artillery brigade headquarters to handle the batteries. III Corps Narrative; Fourth Army GS 262(G), 2 September 1918, "Control of Heavy Artillery in Moving Warfare." [Back.](#)

Note 114: E.g. Lecky's bitter RA/3259 of 17 June 1918. This could be as much an infantry as an artillery problem; the infantry had adapted themselves to trench warfare too. Staff College Syndicate Report 1929/11, "Operations, 4th Army, August 1918 (Special Reference Canadian Corps)." At this point the artillery allocation for a battalion was a section of guns and a few mobile trench mortars. [Back.](#)

Note 115: Haig jumped on the bandwagon as soon as he saw the leaflets; Haig Diary, 23 August 1918. It is not necessary for a commander-in-chief to be the fount of all wisdom, and Haig supported a good idea when it came to him. [Back.](#)

Note 116: C. G. Fuller to Edmonds, 10 December 1939, CAB45/188. III Corps was pushing

heavy artillery forward ahead of the Fourth Army's suggestions during August and September 1918. [Back](#).

Note 117: XIII Corps Narrative, 3 October 1918-11 November 1918; Fourth Army operations papers, vol. 64. [Back](#).

Note 118: WO158/855, "Co-operation of Tanks with other Arms," n. d., but very late 1918; see also Fifth Army SG671/9 of 7 August 1917, Maxse Papers, IWM, file 35/4. Smoke proved useful, and various special methods were adopted such as assigning aeroplanes to watch for anti-tank guns, with the authority to call on 60-pounder batteries. Tanks were, and are, not in themselves decisive. [Back](#).

Note 119: Birch to Deputy Chief of the Imperial General Staff (Harington), 18 May 1918, Anstey Papers. The specific circumstances were coming through the anti-aircraft gunners in England, foreshadowing the 'remustering' of 1944-45. [Back](#).

Note 120: A. G. L. McNaughton "The Capture of Valenciennes: A Study in Co-ordination," *Canadian Defence Quarterly* 10:3 (1933): 279-94. [Back](#).

Note 121: Ibid. 294, n. 8; compare c. thirty-five percent casualties with figures in John Terraine, *The Smoke and the Fire: Myths & Anti-myths of War, 1861-1945* (London: Leo Cooper, 1980), 44, 47. There was a similar loss rate at Hamel, with surprise and tanks helping the attack rather than overwhelming artillery. SS218, "Operations ... against Hamel" [Back](#).

Note 122: See Tim Travers, *The Killing Ground: The British Army, the Western Front & the Emergence of Modern Warfare, 1900-1918* (London: Routledge, 1987), especially parts one and two. [Back](#).

7. Artillery in Defense

1

Introduction

Defense was not the BEF's first priority. The British army was intended to go abroad and bring the King's enemies to heel, not defend a position. Field Service Regulations, the army's standard manual, of course discussed defensive fighting, but gave it less space than how to outpost a position, and only marginally more than billeting. ¹ Artillery certainly had a role in defensive doctrine, and indeed the commander was instructed to choose ground that maximized infantry-artillery co-operation. The artillery was told to command the enemy's infantry movement, dominate enemy artillery, and support friendly infantry under attack. To top this off, an artillery reserve would support counter-attacks. But if all these things were possible it is hard to see why the British forces would be on the defensive. The same enemy superiority that forced a defensive posture would force the supporting arms to change priorities. While attacking infantry needed artillery support to win the firefight and make an attack possible, defending troops were (almost by definition) weaker than their opponents and needed support even more. Artillerymen would find themselves subordinate to the infantry in this facet of operations too, but changes in the army would alter the relationships.

Field Artillery Training said little more about defending than Field Service Regulations did, not even adding the tactical details and suggestions it included for attacks. ² Covered gun positions were judged more likely to be useful in defense than attack, but otherwise the artillery fought with the same methods. Counter-attacks were much like attacks, perhaps requiring even more boldness but not more fire support. Nobody seems ever to have thought of a prolonged defense, or that the majority of British forces might be on the defensive.

1914

The reality of war in 1914, however, quickly saw the BEF fighting defensive battles. The first battles conformed roughly to expectations, with a portion of the force defending to buy time for operations elsewhere, but within five weeks of mobilization the whole BEF was spread out defensively along the Aisne. This was not, as *Field Service Regulations* predicted, so that troops could be concentrated elsewhere for attack but because the whole BEF was overextended. (Actually, troops were concentrated, but they were French and German. Before the war, without formal allies, the British armed forces had hardly considered alliance operations.) This was an unforeseen situation. Nobody was attacking locally, and the scale of the war dwarfed anything anticipated by *Field Service Regulations*. The battles in Flanders would be the first real experience of defensive trench warfare.

At first, this was little different from any other fighting. There were no special tactics for trench warfare, and the BEF fought in the same old way, just from trenches. Artillery brigades remained tied to infantry brigades, somewhat easing communications at the brigade level but making it virtually impossible to concentrate shellfire. Subordination thus wasted artillery's advantage of range, and at times the artillery assigned to an infantry brigade would be withdrawn when the infantry was. ³ The few exceptions to this subordination were remarkably successful—artillery concentrations could produce enough firepower to stop an attack—but the rarity of these exceptions

proved the rule. ⁴ Ammunition shortages were so bad that Haig moved several batteries out of the Ypres Salient because they lacked shells to fire back and were just sitting targets. Fortunately, German offensive tactics—for both infantry and artillery—were as unsophisticated as British defensive tactics. The Germans bombarded an area, then charged in mass formations. The surviving defenders blazed away, supported by all the shellfire that could be arranged. All counterattacks were ad hoc because there was neither time nor means to do anything else. It was a hand-to-mouth period for the BEF, with infantrymen and shells both in short supply. German casualties were immense, and the cumulative toll stopped the offensive. The BEF held most of its ground, and won time, but paid in the universal military currency: lives.

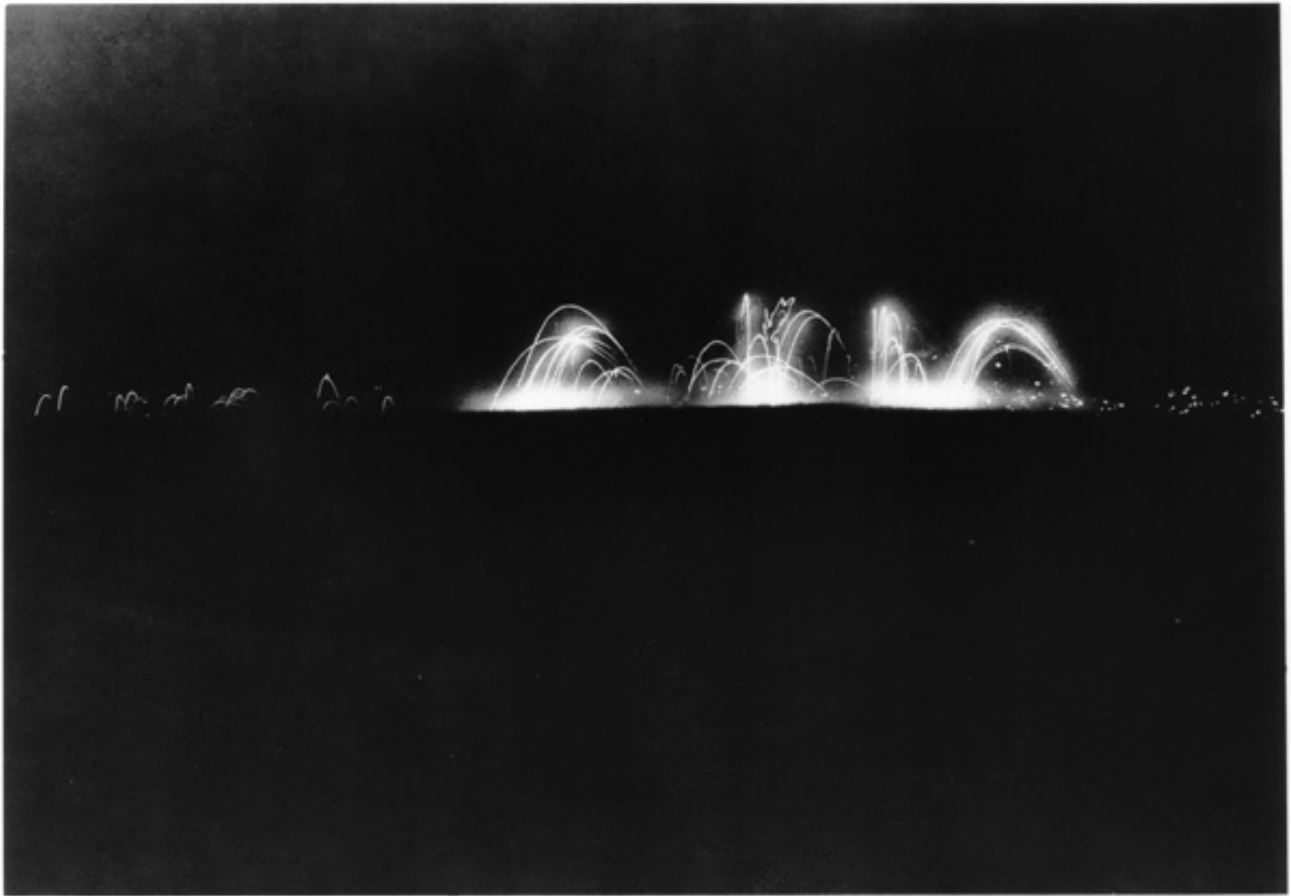
Trench Warfare, 1914-1916

5

Trench warfare flowered over the winter of 1914-15. Previously, units had entrenched for purely tactical reasons, thinking it was temporary. While it started as a defensive arrangement, it subtly broadened into being a way of life, the norm from which everything else differed. The details, the novelty, and the arcane vocabulary sparked intense interest in trench warfare in the Kitchener Armies and in the general public. Interest in mobile training à la the *Field Service Regulations* waned, since it was clearly useless; trench warfare had everyone's attention. There was impatience with generals who were fighting in the old way when the public wanted everything up to date. Brigadier-General F. G. Stone lectured to the Royal Artillery Institution in November 1915 about "Co-operation between Artillery and Infantry," and the bulk of his remarks were about how trench life was organized, giving his audience detailed examples of the latest practices. ⁵

The artillery had their own adjustments to make. Infantry were organized into brigade sectors, and sometimes subdivided into battalion sub-sectors as well. ⁶ A division typically had two brigades in the line, each with two battalions in the front trenches. A third battalion would be in reserve, and the fourth battalion of the brigade would be "resting," but more likely employed on labor details. Artillery was still organized on a divisional basis, and divided among the infantry brigades. Thus an infantry brigade would be covered by its 'own' guns, with the communications network running straight back but with few sideways links. When more guns arrived on the Western Front they were attached to the groups directly rather than held under some central control, be it division, corps, or army. Frequently a wide variety of artillery was assigned to a single group. Thus a humble lieutenant colonel, formerly commanding three 18-pounder batteries, could find himself with field howitzers, heavy howitzers, and mountain guns as well. ⁷ Each had different supply, stabling, billeting, and ammunition requirements, and each needed different kinds of positions for maximum tactical efficacy.

This clumsy arrangement was created for the infantry's convenience. It gave them a single point of contact for all their artillery requests, but it caused trouble for the artillerymen. Some brigades became the bases for these groups and found their tiny staffs inundated with work, while other brigades had their batteries taken away and had nothing to do. Administration suffered, and probably only the limited amount of fighting enabled the system to work. Despite the difficulties, this system of sectors received official backing as late as June 1916, although by then mountain and most heavy artillery had been withdrawn from the divisions, and thus the harried brigade commanders. ⁸



Night scene, Thiepval, 7 August 1916. Some sort of alarm was clearly happening at this moment, but it illustrates the Verrey flares that called down SOS fire.

Source: IWM photo Q1136.

This system made for very good infantry-artillery liaison, but only front-to-back. The infantry battalion in a sector would put up their SOS signal and they would get prompt support. Originally SOS fire was called "night lines," on the theory that pre-arranged fire would only be needed at night—in daytime artillerymen could (in theory) shift their fire to where it was most needed. It was first used on 29 October 1914. ⁹

This system was far from perfect. Guns supporting one battalion could not help the neighboring unit unless the message was first passed up to the CRA by the first unit's artillery liaison officer and then back down to the other artillery group by the CRA. If the brigades were in different divisions, there would be extra layers of problems. Opportunities for maximum effect were wasted through lack of centralized control. ¹⁰ SOS fire lasted for a pre-set period of time, which might be too long (in case of a false alarm, or if a raid were aborted) or too short (if facing a serious attack). Meanwhile, one unit sending up an SOS flare generally provoked a German response, which typically would fall partly on another British battalion, which would want its own artillery support, and the situation could escalate, wasting shells when there was nothing worth shelling. The second pernicious effect

was in reinforcing each infantry unit's belief they had an absolute right to artillery support. Ideally, artillery fire would be used where it would most affect the whole battle, not dissipated in supporting every infantry battalion.

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This was the ideal, but there were reasonable grounds why it did not happen in 1915. First, communications were poor: telephones, switchboards, and even telephone cable were in short supply, so it was not possible to integrate artillery units into a broader attack. Second, it was against all tradition and practice (there were even doubts about the legality of higher artillery command). Third, the infantry battalion in 1915 did not possess the integral firepower that it would develop later in the war. Without artillery support, the infantry might have given way. All this, reinforced by their own problems and views, kept the artillery operating under the same flawed system of directly assigned support.

The BEF had staved off disaster in 1914 at the First Battle of Ypres. The Germans tried again the next spring, but the fighting in the Second Battle of Ypres did not suit the trench-warfare organization into which the BEF had by then drifted. ¹¹ The rigid command and communications organization fell apart after the initial German advance, forcing a return to more or less the methods of 1914. Communications did not work well under either system (if that is not too misleading a word for conditions as haphazard as they were), and eventually the BEF had to shorten its line. The defensive failure at Ypres did not lead to any significant rethinking of defensive policy. Defensive improvements in 1915 called for more trenches, more men, more artillery, and more machine-guns, not better use of available forces. There are three partial explanations for this: there was no formal defensive policy, and no group to review it had there been one; the Ypres defenses had eventually checked the German advance; and the initial breakthrough (that had unhinged the rigid defenses) was not the BEF's fault. Second Ypres was the only large German attack on the Western Front in 1915, so the BEF's defenses faced no more severe test. In July the Germans launched a well-prepared, if small, attack at Hooze. The results showed some defects in British defenses, but caused few changes.

The BEF did make progress in defensive support of attacks. Few people, in or out of uniform, expected the entire German forces on the Western Front to collapse from an Allied attack, so steps had to be taken to protect attacking infantry from counter-attacks, whether immediate or delayed. The attack at Neuve Chapelle featured a "barrage" intended to delay the German reserves—it was a defensive part of an offensive plan. ¹² Otherwise, the plan was silent, apparently since the Germans were not expected to counterattack until British artillery had moved forward. These were two of the three responses to the counterattack problem. The third was purely ad hoc: doing whatever was possible during the battle.

The BEF's small and futile attacks between March and September 1915 did not get far enough to need protection against major counter-attacks. If they gained any ground at all, it was only a trench or two. The short advances made it easier to support the survivors, since the main observation posts (OPs) in the British frontline trenches could see the captured ground and any developing counterattacks, which also reduced the intelligence gathering and communications problems. Of course, German shelling frequently cut the telephone wires from the OPs back to various headquarters, wrecking the communications network, but that would always be a problem.

The battle of Loos was the largest, best-planned, and most successful British attack of the war so far. It envisaged some partially defensive measures built into the bombardment as well as more active steps to support troops against counter-attacks. For the first time harassing fire was organized to interdict German reserves (and the headquarters directing them) before the battle. On the day of the assault this had to be dropped due to gun and shell shortages; there were other things the artillery had to do that were considered more important. Instead, extra care went into reporting counter-attacks, still using OPs in the British frontline, but which now reported to corps-level headquarters. The corps was not only an increasingly important command echelon, it also had enough resources to make a difference, and its participation removed a layer from the command chain. This, in theory, would speed up reactions, and a corps message center became a standard part of British attacks. This was a faint gesture toward centralized control of scarce resources.

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Furthermore, there were detailed plans for guns to advance and provide direct support of the infantry in the mobile fighting that would follow the expected breakthrough. Routes were assigned and special trench bridges provided so that guns could advance and provide both offensive and defensive support. The field artillery would fire pre-planned barrages for 80 minutes, and then advance under divisional command. ¹³ Unfortunately, none of this solved the communications and organizational problems. By moving, the advancing guns put themselves out of communication with higher headquarters while not really solving the problems of liaison with the forward infantry. They were physically closer to the infantry, but those last few yards were still an insurmountable gap. The advanced batteries could not support a unit they could not see unless they could organize a chain of orderlies to carry messages. This had its own problems, starting in the front line: infantry needing support had the most difficulty passing word back. ¹⁴ German defensive artillery barrages were intended to divide the battlefield, separating the forward infantry from both artillery support and reserve infantry. Finally, when news of a counter-attack arrived, the British command structure was not sufficiently sophisticated to rapidly mass fire, and artillery was in such short supply that guns to support one sector had to be pulled away from some other assignment.

In 1915 on the Western Front the Germans were almost totally on the defensive. Thus at Loos there were no large reserves massed for a deliberate counter-attack, though there were tactical counter-attacks during the battle. In 1916 things were different. The Western Front was the main theater. Not only did the Germans launch the Battle of Verdun, they made several attacks -with -limited objectives against the British. And there were large reserves available to counterattack during the Somme, a policy that meant German loss rates roughly matched Allied ones.

The limited attacks were a German specialty; they had begun using large masses of artillery to blast the way clear to a nearby objective in October 1914. ¹⁵ In 1915, most German attacks had involved more than simple artillery superiority: they added mines, poison gas, or flame-throwers. For British staff officers these elements confused the issue, making the main cause of the German success debatable rather than due to the massed artillery. The lack of an agreed-upon reason for the German victories delayed changes in British defensive doctrine. Artillerymen avoided most of the blame. Massed German artillery drove the defenders back, and there was little to be done—the odds were simply too steep. As an example, when in May 1916 the Germans pushed the BEF a little further down the slopes of Vimy Ridge, Haig did not send masses of men or guns to regain the line at any

cost. He bided his time to counterattack, sent his MGRA to better co-ordinate the guns already present, and ultimately never did counterattack. ¹⁶

Few senior officers were sacked for failure in defensive operations: between Second Ypres and the Kaiserschlacht there were only four cases of officers being clearly removed for losing ground. ¹⁷ Sir Horace Smith-Dorrien was sent home in disgrace after requesting a withdrawal around Ypres in April 1915; Sir Henry Wilson was relieved when his corps lost ground on Vimy Ridge in May 1916; after the June 1916 fighting at Hooge the CRA of the 3rd Canadian Division was removed; and the commander of VII Corps was replaced after the German attack in the battle of Cambrai. However, the cases of Smith-Dorrien and Wilson were army politics as much as anything else (each was detested by his commander in chief). ¹⁸ Nor were more junior infantry officers purged when their units failed, and it appears that no brigadier-general or higher was replaced except for wounds. ¹⁹ Botching an attack may have been a greater career risk than being driven back. Probably most hazardous career move—and with the least cause—was failing to hold ground against a counter-attack.

There was also little clear policy governing the defensive use of artillery. The "Artillery Notes" series detailed various aspects of attacking, but the pamphlet "Artillery in Holding the Line" was published in sufficiently small numbers that none have survived. The title alone suggests a passive or at least rigid defensive mentality. Its contents can be surmised as more of the same, approving and elaborating the ad hoc system that had grown up in 1915. "Sectors" were official policy, and SOS lines were normal practice. ²⁰ (Appendix 14 is a period discussion of defense and other topics.) There was no modification of defensive measures to reflect the evolving and improving command system, or any consideration of changes in the infantry. This suggests that doctrine was still compartmentalized. The command system had improved in order to support attacks, and could have helped in defense too, but offensive and defensive were different categories. Also, defense became a more secure proposition as the infantry received more grenades and machine-guns. With their growing internal firepower, did they really need so much artillery support? Should it be provided in the same old way?

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During the Somme fighting there were many German counter-attacks, so the protective aspects of barrages were highlighted. The protective value of creeping barrages had been foreseen in "Artillery in the Offensive," where it mentioned their utility in "stopping any attempts at counter-attack." Beyond this offensive-defense, there were no particular innovations in defensive artillery tactics. SOS signals were still the main way to request artillery support, and the lack of reliable mobile communications made attacking troops vulnerable. A new method developed for coordinating defensive fire in an attack, namely improved RFC-RA liaison. "Zone calls"—reports from air observers reporting German activity by code phrase and map coordinate—were first developed to deal with German artillery, but quickly expanded to deal with all German activity. Lack of confidence drove all the plans. Artillery was asked to fire enough to quash counterattacks by itself. The infantry were too short of integral firepower to defend alone, but they wanted more than artillery help: they wanted the artillery to do it all. ²¹ The principle was broadly that of the SOS call, merely extended into the attack. Later there were some encouraging signs, such as protective barrages (which were fired after the infantry reached their objectives, or at least after they were scheduled to reach them) lifting so the infantry could put out patrols rather than simply digging in

behind a curtain of shells. Against deliberate German counter-attacks, there were no significant improvements. SOS fire was the main artillery response and, while useful, better things might have been done.

1917

1917 provided the BEF a variety of defensive lessons. GHQ had not updated "Artillery in Holding the Line," so defense in trench warfare was unchanged. The re-organization of field artillery, with divisions losing roughly one-third of their guns, was completed primarily to facilitate attacks, but defense played a role. Divisions retained two artillery brigades, which tallied neatly with the two infantry brigades that held the line. Artillery organization was thereby simplified, and divisions could drop "groups" when necessary, while divisions with 48 guns still had enough defensive firepower. This recognized the infantry's greater firepower and fighting skill, but it also took account of the greater firepower the artillery could generate. (This is a tribute to the shell factories: guns without shells are useless, as they were at First Ypres, but with ample shells guns could develop their full firepower.) Before 1917 there was no real 'yardstick' for apportioning artillery in defense as there was for attacks. Now an 18-pounder per two hundred yards of British front was considered adequate, as long as the Germans couldn't mount a surprise attack. (Here the BEF's staff planners recognized that they could not launch surprise attacks and assumed German tactics led in the same direction, toward massive bombardments.) GHQ did point the way from SOS fire to counter-preparation, which was essentially bombardments used to disrupt the attack before it got started, but assumed that there would be enough warning for the artillery in the threatened sector to be reinforced. ²² In 1918 the Germans found a way to mount surprise attacks, and the BEF rapidly had to revise its defensive doctrine because the reinforcing artillery did not arrive in time.

But in 1917 there was little defending to do in the advance to the Hindenburg Line. Allied forces pushed slowly ahead, the deliberate pace chosen expressly to avoid offering counter-attack opportunities. The Germans were no fools, and probed only a few times. The only significant instance was at Lagnicourt, where the BEF had advanced guns dangerously close to the front line to support an attack to their flank. ²³ The Germans mounted a surprise attack, penetrating an extremely thin infantry screen and temporarily over-running several batteries. However, other batteries stood their ground (killing many German infantrymen), and the Australian infantry regained the lost ground, winning four Victoria Crosses in the process. It was a small action that was different enough from the norm of trench warfare so that generalized lessons were hard to detect, but it did not help that the BEF was focused on trench warfare. Mobile operations were not common, and actions like Lagnicourt were considered the exception that proved the rule. And in truth, for trench warfare Lagnicourt did offer few lessons.

The defensive aspect that blossomed during 1917 was protection against counter-attacks. "Artillery in Offensive Operations" called for the artillery to prevent the "assembly and approach of counter-attacks of all sizes." ²⁴ Typical of the prescriptive, centralized style of operations in the BEF, plans were to be drawn up ahead of time for protective barrages during the infantry's consolidation. There were occasional differences from this style, such as Ivor Maxse telling a batch of company commanders to push as far as possible if the Germans were disorganized: "Hold what you can with rifle fire. We will meanwhile organise artillery fire to help you." ²⁵ Protective barrages were also to

be fired "as long as it is required by the infantry," showing that the increasing flexibility of offensive tactics was not matched on defense. As the Germans shifted ever further away from a rigid defense, so the British faced more and more counter-attacks. ²⁶ With more experience, techniques such as using aircraft to send zone calls about impending counter-attacks improved. The improved command system of 1917, which made it easier to switch artillery fire to more important targets, also helped. The German system of counterattacks was occasionally too rigid, and timed counterattacks proved especially vulnerable to British shellfire. German reliance upon counter-attacks (launched, say, three hours after the British attack began) led the BEF to develop special tactics. These included filling valleys with gas (to delay and/or kill German infantry), leaving some routes open until the day of battle and then shelling them, or simply cratering the approach roads. There were also debates over whether to allow the Germans to assemble before shelling them (thus increasing the casualties inflicted) or dispersing counter-attack troops as soon as they were detected. However, this was a peripheral argument: the basic principle was to provide maximum protection to the infantry, using large numbers of shells.

The deliberate German counter-attack attack at Cambrai was the first large attack made upon the BEF since the spring of 1915. It had two wings, one nearly triumphant, the other barely successful. Where it was a success, many of the circumstances were similar to the smaller attack at Lagnicourt: surprise, a thin infantry line, guns primarily employed supporting neighboring infantry, and inadequate communications. Once again guns were overrun but heroic gunners and British counter-attacks saved the day. (The first artillery Victoria Crosses since 1914 were awarded to Sergeant C. E. Gourley and Lieutenant S. T. D. Wallace. Wallace and only five men kept two guns in action for two hours under heavy fire; the men all received the Distinguished Conduct Medal.) Overall, the new German tactics had yielded a substantial success and shook GHQ. According to British expectations, the Germans could not have mounted the attack, not least because there had not been the artillery preparation the British judged necessary because they needed it for one of their own attacks. And while much of the blame was shifted onto the shoulders of the infantry, there was food for thought. ²⁷ The experience was carefully examined for lessons, because the BEF was now on the defensive for the first time since the winter of 1914. The Third Army looked at the fighting around Bourslon Wood, where the line had held, and decided that artillery in sufficient density to support an attack was enough for defense too. ²⁸ Yet this would be little comfort where the artillery was not concentrated, since the norm for holding the line was an 18-pounder every two hundred yards, a far cry from the attack formula of one per twenty-five yards.

1918

1918 began under very different strategic circumstances than 1917. Thanks to Russia's collapse, the Germans were shifting troops from the Eastern Front. After heavy losses during the Nivelle Offensive in spring 1917, the French Army was hesitant to attack. The Americans were arriving but would take a long time to make their presence felt. The Germans had, for the first time since 1914, a numerical superiority on the Western Front, and they intended to attack before the increasing American strength tipped the balance.

This put the BEF in a defensive posture and required new plans. GHQ took firmer steps than previously to organize defenses and establish a standard policy. Over the winter of 1916-17, several

armies had formulated their own policies, focusing more on staying aggressive and maintaining the initiative than on minimizing casualties and sparing time for training. (The Fifth Army alone had fired over 2,000,000 rounds despite never attacking in more than battalion strength. ²⁹) Now the whole BEF needed a quiet period to reduce casualties, allow training, and improve their defenses. Artillery policy was heavily affected. Previously the artillery had been aggressive, with three main components to its policy. First, there was steady counter-battery fire, trying to suppress all German shelling and also looking to destroy some German guns. Second, the artillery would blast German positions, either to ease the life of the British trench garrisons or to prepare for a local attack. (Appendix 29 and Appendix 30 are orders for the Third and Fifth Armies for the winter of 1917-18.) Third was harassing fire to inflict casualties and lower German morale via the strain and losses. But now a live-and-let-live approach operated for the artillery and infantry. This was especially true where British troops relieved the French, since the French usually made few aggressive moves other than launching major offensives; to them trench life was very quiet. Now if the BEF continued the French *modus vivendi* it would deceive the Germans about Allied moves and dispositions. ³⁰ Even the normally aggressive Australians were restrained, "as it is not desired to stir the enemy into activity without good cause." ³¹ The Fifth Army, in contrast to the previous year, ordered no harassing fire and no bombardments. ³² It was recognized that some offensive action was needed, and destructive shooting did continue, largely in the form of counter-battery fire.

The change in artillery activity was the result of a new pamphlet on "Artillery in Defensive Operations." ³³ (This is available as Appendix 33.) It dealt with all facets of artillery defense, from underlying principles, through tactics, to advice on how to disable a gun about to be captured. It drew together the trends of 1917, including limiting SOS fire and supplementing barrages with counter-preparation—shelling the enemy as they prepared, before a defensive barrage was even necessary. ³⁴ The authors were no radicals and elaborated GHQ's own instructions from early 1917, ³⁵ but even before GHQ could promulgate the new policy various armies were doing the right things. ³⁶ Even while "Artillery in Defensive Operations" was delayed for approval, Birch was urging armies to operate according to the 'ABCs' or first principles. ³⁷ (Birch's memo on this is available as Appendix 31.)

The policy was comprehensive, including trench mortars and machine-gun barrages. In 1917, artillery officers had integrated these weapons into creeping barrages, and now they would be integrated defensively too. In essence, this policy put an artillery office in charge of all the fire support for a sector, which was then wielded from a central headquarters—if communications permitted. Areas would be covered by artillery, mortars, or machine-guns, whichever provided better coverage. Later in 1918 this was taken even further, with GHQ ordering that some sectors be left unsupported instead of fire support being uselessly thin everywhere: "It is far better to search two or three sectors of the front thoroughly than to distribute fire of less violence and density over the whole front." ³⁸ This was the final step in removing the infantry's 'right' to artillery support. Established by default with the first "night lines," the idea was obsolete by mid-1917 (at least for quiet sectors) but had never been officially revoked. British infantry were flatly told that "repulse of assaults" was only the *third* priority of artillery, behind "destruction of the enemy's fighting power" and bombarding communications. Mere retaliation for hostile shelling was obsolete for counter-battery work, and now its twin in defensive doctrine also passed away.

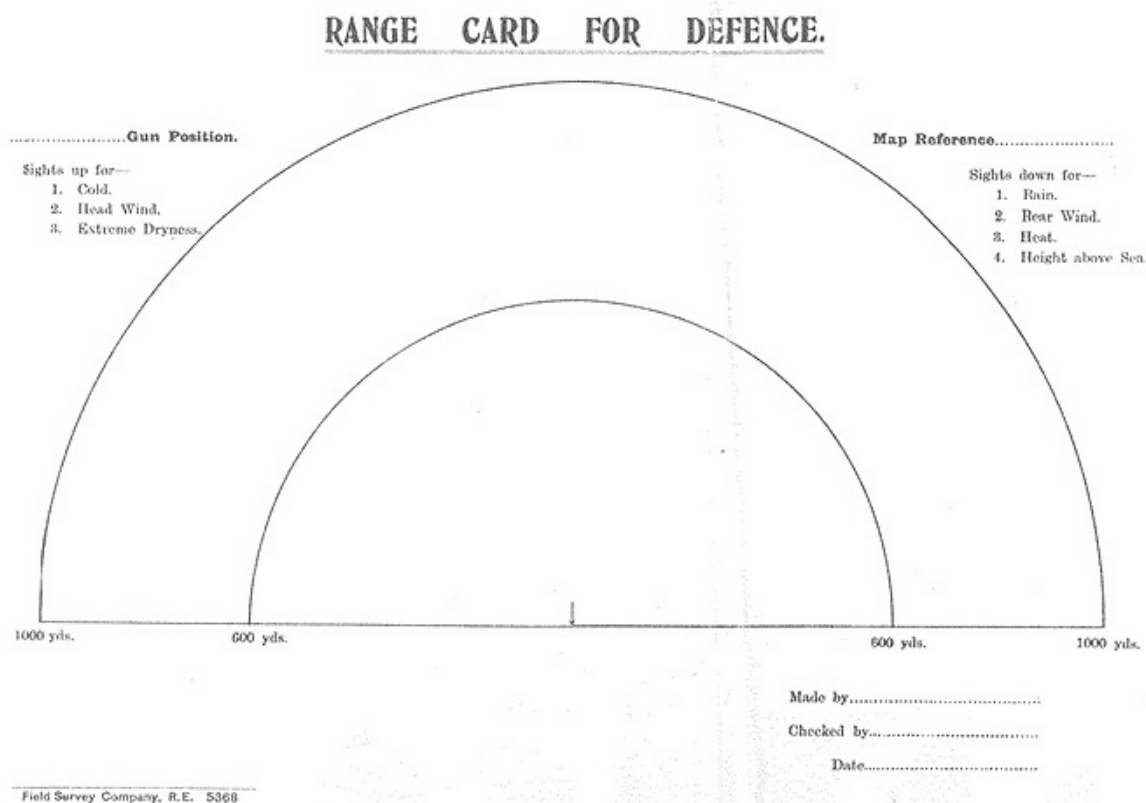
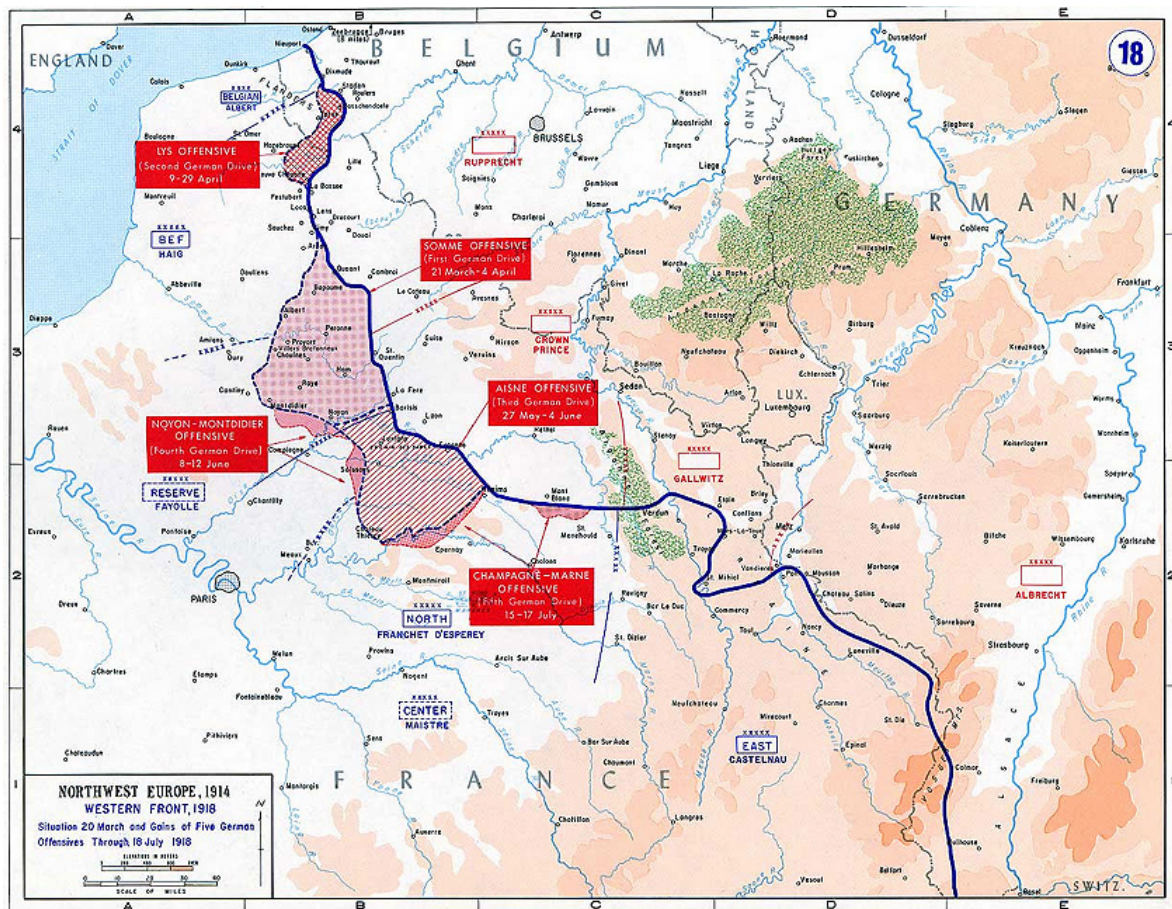


Diagram 3: Range Card for Defence. Each and every gun in a defensive position would have one of these range cards prepared. It would show the various close range targets that the gun would be expected to engage, so that targets could be engaged quickly.

Source: WO158/1218.

In common with the whole command system of the BEF, the policy assumed considerable centralization. (Diagram 3 illustrates how much information had to be prepared for a defensive position that would become useless if the line moved.) Centralization theoretically leads to efficient use of scarce resources, but it relies on the rapid transmission of accurate information in substantial quantity. The Germans took stringent measures to preserve secrecy, measures that worked despite British probes. The Fifth Army tried stratagems such as shelling bridges and roads just behind the German line, hoping that repairs would indicate German offensive plans. ³⁹ Passing messages in World War I was never easy, and reliance upon centralization invited trouble if the system broke down. At the tactical level, one battery later reported "the more [telephone] wire you give us the more Huns we shall kill," while a brigade commander thought the effort of digging gun positions would have been better spent burying cable. ⁴⁰ The Germans took quite sensible measures to shell British headquarters, telephone exchanges, and other key communications points. They also built more flexibility into their tactics and were just plain lucky that the weather hampered the British defense. All this contributed to the collapse of central organization in British resistance, and turned the March Offensive into an enormous 'soldiers' battle' fought at the battalion and battery level. ⁴¹

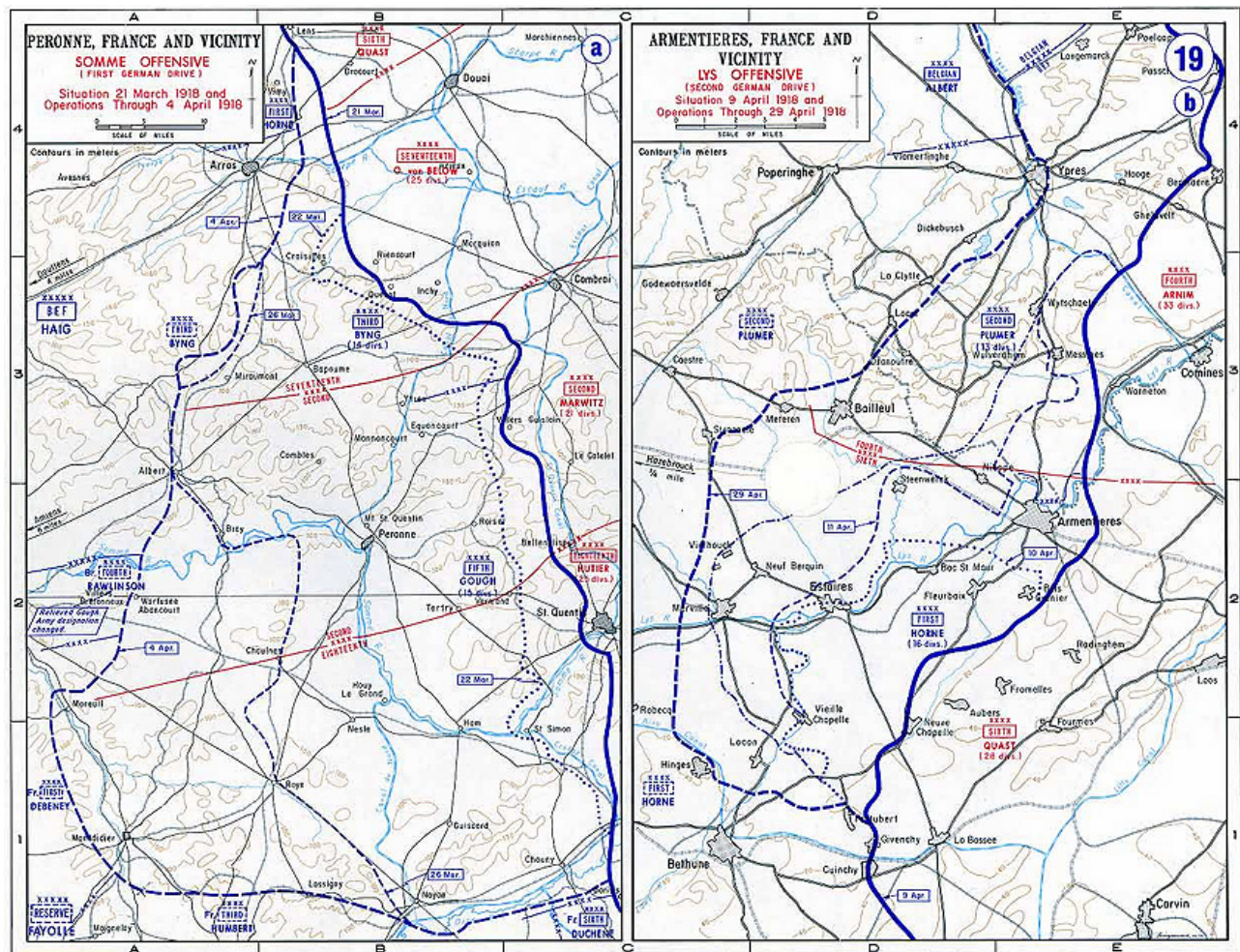


Map 16. Western Front, 1918, German offensives through mid-July. This map shows the situation on the Western Front after the German offensives had petered out, and as the BEF was regrouping. Minor attacks and heavy artillery fire were the main British aggressive acts until the major counteroffensives began in mid-July.

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>.

The German offensives began before dawn on 21 March 1918 with a massive offensive mainly against the British Fifth Army. (Map 16 and Map 17 show the main German offensives in the British sector and on the Western Front in 1918.) Before the British even fired on 21 March, they had to abandon the new doctrine. The Germans had (as at Cambrai) achieved surprise, so the Fifth Army's artillery had not been reinforced. The tactical surprise meant that counter-preparation was ineffective, but the strategic surprise meant that the British reserves were elsewhere. There was not enough artillery in the Fifth Army to make much difference with counter-preparation fire even if there had not been tactical surprise. During the Kaiserschlacht (or 'Michael' offensive), events went badly for the BEF, and the artillery was caught in the thick of things. The Germans had pinpointed most British battery positions and gassed them heavily, greatly reducing the effectiveness of the coughing, half-blinded gunners struggling in their masks. Thanks to the mist and German shelling of telephone lines, some batteries never saw SOS flares or received orders to fire. Communications collapsed in the first few minutes, fatally compromising any chance for proper counter-preparation fire or centralized control of the battle. ⁴² Instead, isolated batteries and even single guns ⁴³ fought

their own battle, frequently firing over open sights until ammunition was exhausted, sometimes providing barrages that were far too thin and too narrow. The batteries held in reserve were the most useful of all; the Germans had not identified their positions, and while in reserve they trained for mobile operations, which turned out to be just what was needed. ⁴⁴



Map 17. Western Front, Michael and Georgette Offensives. This map shows the first two successful German offensives of 1918; the failed attack of 28 March around Arras is omitted

Source: <http://www.dean.usma.edu/history/dhistorymaps/WW1Pages/WW1ToC.htm>.

The tale of the first ten days is replete with stories of unsupported guns holding off German infantry but, just like local successes by the infantry, eventually a flank was turned somewhere and the whole line had to pull back. Nobody can question the gunners' individual bravery, but there was no opportunity for artillery to have more than a local effect on the battle. Liaison became increasingly difficult, and at least one corps re-organized its artillery to cover sectors completely divorced from those of the infantry divisions. ⁴⁵ This was an important step away from uniform defensive barrages and towards destructive concentrations. When not fighting separately, artillery was being used to

influence the entire battle by concentrating on key sectors. Some infantry would lose support, since decisions on where to concentrate artillery were made by formation commanders who focused the fire where it was most needed. Artillerymen offered technical advice on weapon limitations, and doubtless made suggestions, but they were not the final arbiters of who did or did not get support.



RGA sergeant copying down instructions for SOS lines, Monchy-le-Preux, 18 March 1918. The quantity of data the sergeant has to record shows some of the technological advances the Royal Artillery made during the war. In addition to this information, recent meteorological information would have to be considered, and each gun's individual wear would have to be factored in as well. In defensive fire this was paradoxically somewhat less important than attacking, because defensive fire that came to friendly troops at least did so while they were in cover. However, accuracy in bombarding and counter-battery fire was extremely important. **Source: IWM photo Q10895.**

As was only natural for a commander in chief, Haig did his utmost to encourage the troops and learn from the battle. He visited many headquarters, and usually took Birch with him. ⁴⁶ Beyond absorbing the lessons themselves, there was little that could be done to affect the fighting spreading across the old Somme battlefield. Birch spotted the right lessons—especially the need to use heavy artillery immediately or not at all—and the crying need for mobile training of the field artillery. ⁴⁷

The heavy artillery had many problems. Many heavy guns were captured, and the rest were slow to move, slow to get ready to fire, and slow packing up to move to new positions. The result was that they had to be withdrawn from action earlier than the field artillery, or even more would be

captured. The rule of thumb was that if the front moved faster than three miles per day, heavy artillery could play no useful role. ⁴⁸ Additionally, the breakdown in intelligence hurt heavy artillery. Since it fired at specific targets rather than at a general line in front of friendly infantry (because of the lethal radii of heavy shells, they had to be fired well away from friendly troops, even in defense), the wrecked communications network thrust the big guns deep into the fog of war.

Most histories present the Lys offensive (starting on 9 April) as the second German offensive in 1918. This however ignores the Third Army's comprehensive defensive victory along the Scarpe on 28 March, known to the Germans as the 'Mars' offensive. ⁴⁹ This was a victory won largely by superior firepower, and there are strong signs that GHQ anticipated the attack and took steps to maximize British firepower rather than adding manpower. (Perhaps firepower was all that was possible, because the ongoing 'Michael' battles were absorbing all the BEF's reserves and more.) The day before the attack, Haig sent Birch (who at least had second-hand experience from visiting most of the corps involved in the Kaiserschlacht) to advise the Third Army on defensive artillery measures. ⁵⁰ The key suggestion was to keep a central reserve of heavy artillery, under command of the Army MGRA. Coming one day before the attack, this idea had little effect; there was no time to reorganize commands and for all the subordinate formations to adjust their plans. Rather, tribute must be paid to the fighting qualities of the British infantry, but their close artillery liaison should not be forgotten. ⁵¹ The field artillery fired an average of 750 rounds per 18-pounder in a single day, one of the heaviest efforts of the war, and the heavy artillery engaged German infantry as close as six hundred yards. ⁵² Counter-preparation worked well, barrages worked well, and everything showed just how good British defensive measures could be. The four British divisions lost only a few trenches, and the reserve infantry were able to play cards all day long; only in the evening were they moved, and then to relieve tired units. A German history reports that the attack failed "because of the great disturbance caused by the British artillery fire," and at the end of the battle eleven divisions had been stopped by four. ⁵³

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The key point was advance warning, which allowed counter-preparation to be fired when the Germans lacked time to recover from its effects. ⁵⁴ If it were fired too soon, the British batteries would be revealed for the Germans to shell during their preliminary bombardment, while the German assault troops would not yet be in the trenches. If fired too late, the assaulting troops would have left the trenches and the shellfire would 'hit the air.' The BEF learned that counter-preparation had to be as intense as offensive barrages, not merely desultory. ⁵⁵ Decisions this important were not left just to the gunners, but reached to the highest operational levels.

By the time the third German offensive (the Battle of the Lys, or 'Georgette') was launched, the BEF had absorbed even more lessons. The partial German success was largely due to the disintegration of the Portuguese forces; some British divisions stood their ground as well as the Third Army's had. ⁵⁶ Here, too, the BEF had adequate forces, because Flanders was the shortest way to the British supply bases and the Channel ports. Again surprise was a key factor, precisely because the Second Army had enough artillery (and the Third Army had demonstrated how to use it) to disrupt an offensive before it could fairly get underway. Despite the British strength, once the Germans had created their hole the British line had to retire to avoid being outflanked, and the lessons of mobile operations were the same as those learned further south: heavy guns could not function if they had to move far; mobile field artillery reserves were vital; and German attacks could (sometimes) be stopped by

direct fire. (Part of an official report on operations is available as [Appendix 34.](#)) ⁵⁷ Birch appeared at the Second Army's headquarters on another of his missions, this time to ensure that someone was organizing artillery on the flanks of the attack to cover any necessary withdrawals. ⁵⁸ Similarly, there was now freedom to consider when it was justified to risk guns in order to inflict maximum casualties on the Germans (previously every nerve was strained to save the guns). ⁵⁹ Another factor to be balanced was counter-battery fire against killing German infantrymen. While valuable when no attack was expected, counter-battery fire disclosed battery positions to the Germans and invited neutralization during an attack. ⁶⁰ These were nail-biting decisions for the General Staff, corps, and army commanders. Artillerymen made suggestions, but not the final decisions. By this time there was ample general experience and growing defensive experience in the BEF, so beyond technical details artillery officers had little to add.

'Georgette' showed nothing very new, really only reinforcing the lessons of 'Michael.' GHQ had organized an inquiry into 'Michael' even before the Germans had been brought to a complete stop. ⁶¹ Corps, divisions, brigades, and even batteries were called upon to give their account of the battle, not filling out a form that would shape comments nor, crucially, as part of a blame game or witch-hunt. GHQ genuinely wanted to find what worked and what failed. After the Lys offensive burned out, the process of learning lessons was repeated, with all echelons of the Second Army quizzed for their experiences. (One of these can be read in [Appendix 34.](#)) There was little new to be learned from 'Georgette,' but GHQ was not slow to jot down and disseminate what there was. "Notes on Recent Fighting" leaflets appeared almost while the Germans were attacking, and while they were probably useful for the bulk of the BEF, they cannot have been regarded with much awe by troops still in action.

'Georgette' was the last major offensive the BEF had to withstand. When IX Corps was attacked on the Aisne in late May, it was part of a French army and was operating under their orders. Despite the IX Corps' heavy casualties, and the vastly different circumstances, GHQ still probed for lessons. More "Notes on Recent Fighting" stemmed from the Aisne battle, focusing on German tactics because there was little to be learnt from the French ones. For instance, German gas tactics depended on the properties and effects of their gasses rather than the layout of Allied defenses. The BEF knew enough to winnow useful lessons from the chaff.

The bulk of the BEF spent May, June, and July merely holding the line, but this was not the relatively passive trench warfare of 1915-17. Raids and patrols were more common than ever. There were two reasons: British divisions were absorbing large numbers of semi-trained men and wanted to give them some experience, and GHQ (as always) wanted to maintain the initiative. The raids were more successful than ever before because of weak German defenses and mediocre German infantry. Defenses were weak since the Germans were mostly defending where their attacks had run out of steam, not on ground chosen as good defensive terrain. ⁶² The German infantry holding the line was mainly the leftovers after the best soldiers had been skimmed off for the assault divisions that had been decimated in the spring offensives. Not only were the remnants weaker in numbers and weapons, they knew they were second rate. The British infantry finally achieved morale superiority across No-Man's-Land, as their prisoner 'bags' proved.

GHQ sensed the shifting balance on the Western Front and, while cautious as long as the Germans had a large reserve, adjusted artillery policy accordingly. Over the winter the Royal Artillery had been reined in to avoid provoking the Germans. Now unbridled but intelligent aggression was the order of the day. Destructive counter-battery work, short but intense trench bombardments, and thorough harassing fire took place up and down the line. ⁶³ Every technological aid was called upon: sound ranging was effective against hastily emplaced German batteries; the RAF dominated the skies watching for any movement; and calibration allowed sudden concentrations of fire. Counter-battery fire was especially important, and relentlessly chewed up the German artillery. Leaving aside the guns captured, German artillery losses from British counter-battery fire alone ran at about ten percent per month in this period, a completely unsustainable rate. ⁶⁴ The constant aggressive fire was co-ordinated by experienced staffs that had done it all before—and done it under less favorable circumstances. Now they had the opportunity to demonstrate their skills and techniques, and they had too much power at their fingertips for the Germans to withstand. The Germans withdrew from several salients and exposed sectors because the British artillery made them too expensive to hold. Forcing withdrawals without attacks was a major achievement, and it shows the level of superiority the Royal Artillery had achieved.

Once the Allies shifted onto the offensive there was virtually no more defensive fighting for the BEF. Naturally, trench warfare persisted in some sectors, at least until the offensive spread to that sector. The First and Second Armies were harassing and raiding the Germans, while the Fourth Army was rounding up prisoners in myriads during the Battle of Amiens. However, the defensive-offensive measures in barrages disappeared. They did not dwindle, but disappeared as soon as it became clear that major German counter-attacks were a thing of the past. The counter-attacks that took place were modest tactical affairs and could be handled by the close support artillery or by direct communication with supporting batteries. Here the decline of German artillery was a key element, because less German shelling meant less risk of telephone cable being cut. ⁶⁵

Conclusion

At the end of the war, the artillery had changed their defensive role with the concurrence of the rest of the army, but only after having spent years not achieving their potential. Before the war there was no particular defensive doctrine for the artillery; indeed, the whole army lacked one. Defense was a condition that might occur, but nobody worried very much about it. The principle of economizing men for action elsewhere was clear, but the British army had a great many clear principles, some of which overlapped. What it lacked was guidance on how to implement the principles, and that came only through experience.

Thus when trench warfare developed it first took the shape of mobile warfare, simply entrenched. Artillery was assigned to infantry in mobile warfare and trench warfare alike. The artillery's role was unchanged (supporting the infantry unit they were assigned to) but no longer entirely appropriate. While there were extenuating circumstances with the communications problems, and very gradual improvement in defensive methods, artillery was not well integrated into the defensive effort. Despite these problems, as soon as the BEF put its mind to defensive policy it developed a successful one. "Artillery in Defensive Operations" saw a more flexible and better-integrated role for defensive artillery, paradoxically by freeing it from simply supporting the infantry in front. Yet

freedom from the control of the front-line battalions did not mean that the artillery did their own thing on the battlefield. Artillery firepower formed the framework for the defense whether in counter-preparation or defensive barrages, and the results (as at the Scarpe) proved the value of the concept. This was an outstandingly successful integration of the artillery into an overall battle plan, recognizing—as the previous total and willing subordination had not—artillery's unique abilities. Nor were the few remaining months of trench warfare wasted: the BEF established a dominance that paved the way for and continued into its attacks.

If defensive artillery power used the techniques of the offensive bombardment and barrage, defense against counter-attacks became indistinguishable from a normal attack. It fluctuated with views of the infantry's abilities: the weaker the infantry were rated, the denser the protective barrage had to be. Eventually the quality of the German infantry declined to the point that the few guns detached for direct support of the infantry were usually enough to fend off tactical counterattacks. But the larger problem was never solved. There was no way to bring concentrated firepower onto counter-attacking troops, mainly because communications usually broke down. The answer was a decade of progress on radio, a luxury of time that nobody in the First World War had.

Notes:

Note 1: *FSR*, §107-110. [Back](#).

Note 2: *FSR*, §158-63. [Back](#).

Note 3: *OH 1914*, vol. 2, 249. [Back](#).

Note 4: *OH 1914*, vol. 2, 227, 263. [Back](#).

Note 5: F. G. Stone, "Co-operation between Artillery and Infantry," *JRA* 42:9 (1916), especially 462-3. Stone had been recalled from retirement to be CRA of the 18th Division, with which he had gone to France but only for a few weeks in the line before he was relieved by a younger officer. Stone was made CRA of another division at home, which he trained before it too was sent to France with a younger CRA. The latter was a common practice. [Back](#).

Note 6: J. Macartney-Filgate, *The History of the 33rd Divisional Artillery in the War 1914-1918* (London: Vachars, 1921), 15. [Back](#).

Note 7: J. G. Geddes Diary (RAI Military Document 1135), 27 December 1914. [Back](#).

Note 8: "Notes on Artillery," WO33/756, June 1916. [Back](#).

Note 9: Farndale, *Western Front*, 73. [Back](#).

Note 10: See "Instructions for Artillery Defence of 7th and 8th Division Front," 30 April 1915, WO95/87. [Back](#).

Note 11: Farndale, *Western Front*, 92-103, has considerable detail about various actions. [Back](#).

Note 12: Haig jotted in his diary two tasks for artillery: destroying obstacles and protecting British infantry against counter-attack. This indicates a simple faith in the superior qualities of British infantry and suggests why an infantry-supporting barrage was not developed sooner. Haig Diary, 6 January 1915. [Back](#).

Note 13: I Corps Operations Order No. 106 (20 September 1915), WO95/619. [Back](#).

Note 14: Farndale (*Western Front*, 126) gives the situation for the 9th (Scottish) Division. [Back](#).

Note 15: Bruce I. Gudmundsson, *On Artillery* (London: Praeger, 1993), 44-50. [Back](#).

Note 16: Haig Diary, 22 May 1916. The question of promotion and replacement of artillery officers is too complex to be dealt with here, but seems to have been inconsistent. [Back](#).

Note 17: Compare with unit commanders' removal in Tim Travers, *The Killing Ground: The British Army, the Western Front & the Emergence of Modern Warfare, 1900-1918* (London: Routledge, 1987), chapter 1. [Back](#).

Note 18: Herbert Plumer's position in early 1916 was shaky, but he survived in command of the Second Army. [Back](#).

Note 19: Methodology for this admittedly brief survey was simple: comparing a division's battle honors with the nominal roll of commanders in Becke's Orders of Battle series to check for changes in immediate response to battles. [Back](#).

Note 20: What material that survives, notably "Notes on Artillery" (June 1916, WO33/756), supports this. It discusses sectors, night lines, and allotted batteries as the rule, then moves on to ways of harassing the Germans. [Back](#).

Note 21: It is important to note this was not universal, and CDS50 ("Tactical Notes," 31 July 1915) suggested allowing the Germans to assemble, then inflicting heavier casualties rather than dispersing counter-attacks before they formed. [Appendix 9](#) [Back](#).

Note 22: OA337, 14 January 1917, WO95/519 (Fifth Army General Staff war diary). [Back](#).

Note 23: *OH 1917*, vol. 1, 370-7. [Back](#).

Note 24: SS139/4, February 1917. [Appendix 20](#) [Back](#).

Note 25: Maxse Papers, IWM, file 53, conference 5 July 1917. This was close to the German idea of pressing an attack as far it could go; those who criticize the BEF for not following this route should contemplate the results of this one instance when it did. [Back](#).

Note 26: See G. C. Wynne, *If Germany Attacks: The Battle in Depth in the West* (London: Faber & Faber, 1940) for an account of German defensive tactics. [Back](#).

Note 27: The corps commander was, after a short interval, replaced. [Back](#).

Note 28: WO158/316. [Back](#).

Note 29: "Report on the Advance of the Artillery of the Fifth Army from February 24th to March 30th 1917," Uniacke Papers VII/1. [Back](#).

Note 30: III Corps BGRA Diary (WO95/692), 26 January 1918. [Back](#).

Note 31: ANZAC Corps BGRA Diary (WO95/994), 3 February 1918. [Back](#).

Note 32: Fifth Army Artillery Instruction No. 83, 27 December 1917, Uniacke Papers VII/3. [Back](#).

Note 33: SS139/7, February 1918. [Back](#).

Note 34: Counter-preparation might differ little from SOS, and was sometimes fired whenever the 'wind was up,' to use the period phrase for a pointless alarm. III Corps BGRA Diary (WO95/692), 30 November and 11 December 1917. [Back](#).

Note 35: OA337, 14 January 1917. [Back](#).

Note 36: Second Army, 18 January 1917, WO95/276; Montgomery-Massingberd Papers, LHC, file 7/17, "4th Army Policy on the Army Front for 1918," 20 January 1918 for the Ypres Salient. [Back](#).

Note 37: The Second Army claimed it was issued 21 March 1918, the day of the German offensive. Some units may have waited for copies, but the ideas had been implemented earlier. (WO95/277) Birch toured Ypres on 9 February 1918 and discussed the artillery defense of salients, obviously drawing local conclusions, while SS139/7 awaited Haig's signature. RA/G/5, memo to CGS, 10 February 1918, Rawlins Papers, file 12b. [Back](#).

Note 38: Fifth Army letter OA196 passing on the letter from CGS to Armies of 20 July 1918, WO95/902. See also Bailey, *Field Artillery*, 145-8. [Back](#).

Note 39: III Corps BGRA Diary (WO95/693), 14 February 1918, VII Corps BGRA Diary (WO95/812), 12 March 1918. Why the Germans achieved surprise is beyond the scope of this research. There were strong indications that Germans intended attacking near St. Quentin, but they also engaged in buildups opposite more important sectors. [Back](#).

Note 40: WO158/343; W. H. F. Weber, "With the Field Artillery from Trench to Open Warfare on the Western Front," JRA 45:11-12 (1919): 358, which is also an extremely interesting account. [Back.](#)

Note 41: Farndale, *Western Front*, 262-279, has many accounts of the fighting, while Martin Middlebrook, *The Kaiser's Battle: 21 March 1918, the first day of the German Spring Offensive* (London: Penguin, 1983), concentrates on the preparations and the first day. [Back.](#)

Note 42: VII Corps, facing the full brunt of the German attack, signaled the heavy guns at 0455 to fire on German trenches, but for most batteries it was already too late. VII Corps BGRA Diary (WO95/812), 21 March 1918. [Back.](#)

Note 43: Single guns were forward for a variety of reasons: to snipe at German movements, or pretend a battery position was occupied, but mainly as anti-tank guns. Having introduced tanks to the world, the BEF was well aware how they aided attacks. [Back.](#)

Note 44: Horse artillery batteries also proved the worth of their mobile training. [Back.](#)

Note 45: XIX Corps of Fifth Army; *OH 1918*, vol. 2, 95. [Back.](#)

Note 46: Haig Diary, March-April 1918. [Back.](#)

Note 47: See, for example, the Third Army's lessons, WO95/370, 7 May 1918. The Fifth Army also reacted while the retreat was still underway, making such points as that the short German bombardments meant the Royal Artillery could use more intense counter-preparation themselves. III Corps BGRA Diary (WO95/693), 6 and 8 April 1918. [Back.](#)

Note 48: "Heavy Artillery XVth Corps Report on Operations 9th to 17th April 1918" (n.d.), WO95/927. [Back.](#)

Note 49: This is not limited just to those derogatory of the BEF; John Terraine's *To Win A War: 1918, The Year of Victory* (New York: Doubleday, 1981) does not mention the 'Mars' battle, and even the *OH 1918*, vol. 2 gives it only seventeen pages. [Back.](#)

Note 50: Haig Diary, 27 March 1918. This mission appears neither in Third Army operations reports nor in GHQ-Third Army correspondence. It is, however, powerful evidence that the German attack was anticipated. [Back.](#)

Note 51: The front here had not moved for almost a year, allowing the perfection of the fixed defenses. The terrain also favored the British, and German tactics were poor. [Back.](#)

Note 52: *OH 1918*, vol. 2, 73. [Back.](#)

Note 53: Quoted in Farndale, *Western Front*, 275. [Back](#).

Note 54: German preparations were also not as thorough as before 'Michael.' [Back](#).

Note 55: XV Corps BGRA Diary (WO95/925), 31 March 1918. [Back](#).

Note 56: Among these was the 55th (West Lancashire) Division, which had already experienced the new German tactics at Cambrai, which may have affected their defensive plan. [Back](#).

Note 57: The whole "Report on Operations Undertaken by IXth Corps between 9th and 21st April 1918," dated 20 May 1918, is in WO95/841. [Back](#).

Note 58: Haig Diary, 13 April 1918. [Back](#).

Note 59: Reserve Army Artillery Circular No. 1 (7 April 1918) WO95/521; Haig Diary, 18 April 1918; XIII Corps BGRA Diary (WO95/902), 28 April 1918. [Back](#).

Note 60: J. H. H. Jones to Edmonds, 23 February 1928, CAB45/186. Jones was CBSO of XVII Corps in 1918. [Back](#).

Note 61: XIX Corps were asked on 6 April 1918, well before the line had consolidated. Sandys Diary, 6 April 1918. Sandys was BGRA of XIX Corps. [Back](#).

Note 62: This was a problem the Allies had for much of the war, and something the Germans had spent much of 1916-17 trying to avoid. See Wynne, *Battle in Depth*, on the Germans yielding tactically useless ground. Even during 'Georgette,' GHQ had to prompt the Third Army to take this advantage; WO95/369, 17 April 1918. [Back](#).

Note 63: Occasionally armies suggested more orchestrated destruction for artillery in trench warfare, as the Third Army did in July 1917, strongly deprecating retaliation in favor of organized destruction. III Corps BGRA Diary (WO95/692), 17 July 1917. The Third Army had to remind its corps: WO95/365, 10 August 1917. [Back](#).

Note 64: In September, XV Corps examined the German gun positions on ground recently re-captured and found seventy percent of their shoots had been at least "quite effective." WO95/925, c. 28 September 1918. [Back](#).

Note 65: E.g. the Fourth Army's experience on 19 September 1918, WO95/439. [Back](#).

8. Training and Schools

1

Introduction

An army should train for the battles it expects to fight. The Royal Artillery was well trained before the war, and the training was indeed matched to the battles that were anticipated. But when the real war proved different from expectations, it was already too late to retrain the artillery, let alone the whole army. It would have been impossible to go back to square one while fighting a war, and nobody tried. Yet artillerymen knew that their 1914 standard was not enough, and they improved by gradual increments, though as rapidly as possible. A major delay to improving the level of training was the huge expansion, far beyond just mobilizing reserves, that lasted into 1917 and required training roughly half a million men. Training, both basic and advanced, was always conducted within the pre-war paradigm that viewed artillery as a supporting arm, not a branch angling for a new combat role. Wartime training anticipated a Second World War comment of Montgomery's—that the artillery must first train itself and then train the infantry to use the artillery properly. ¹

Before the War

Before 1914 the dispersion of the British army across the Empire and the British Isles greatly affected its training. Many posts were small, and brigades were fragmented to save money or support the civil government rather than concentrated for formation or combined arms training. There was an annual training cycle with two seasons. First came individual training, to teach the soldier the specific skills needed to do his job; in the artillery, this included training a gun detachment as a whole. Then, collective training (including firing practice) molded the guns into a battery. Partly because so many units were scattered around the empire, most training time was spent at quite low levels: battery, company, squadron, or battalion. There was some time allotted for brigade-level training, if a full brigade could be assembled. On top of this were maneuvers, but these did not happen every year, nor were all units involved.

Individual training could be done in barracks and on parade grounds, but firing could only take place on the ranges. There were several artillery ranges in the British Isles, but most were only barely large enough for modern artillery. This limited the number of possible firing positions and target areas, so practice camps became ritualized, with targets popping up in the same spots year after year. ² Commanders learned what the range to the target area was, and over time, since all units would hit the well-remembered targets, the training lost most of its value except to see which unit could open fire first. These problems of utterly fictitious firing conditions were compounded by the fact that no more than six hundred shells were allowed for annual firing, and that counted both those fired in collective training and at practice camps. ³ This meant that a gun would fire only a few rounds per "tactical situation," and it gave the entire proceedings an air of unreality. ⁴ One step taken at some (but not all) camps was to conduct joint tactical exercises with the infantry, encouraged by the 'affiliation' of infantry and artillery brigades after 1907. ⁵ But again these could be mere ritual, since the guns had to stop firing just when the infantry reached the crucial moment of assault. ⁶ The decline in standards

of officers and NCOs (particularly battery commanders and Battery Quarter Master Sergeants) was a perennial complaint of senior officers. ⁷ Yet if prewar tactical ideas quickly went out of date, many of the individual skills did not. These were useful building blocks, but were hardly comprehensive.

These comments cannot be uniformly applied, because there was no tactical uniformity within the Royal Artillery. Batteries trained separately, brigades had different ideas, and divisions were equally diverse, and to top things off, many batteries were not even assigned to divisions. Even though the CRA's peacetime duties centered around training, they had relatively little discernible input. They could fuss around their brigade commanders, but it certainly did not help that some CRAs were less than impressive to their subordinates. One officer later wrote, phrasing it delicately, that F. D. V. Wing (CRA of the 5th Division) "may have given the impression that he knew little about Gunnery detail." ⁸ There was no central school for artillery officers or gunners—even though some senior officers wanted one—probably because it would undermine the authority of the division commanders. ⁹

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The Royal Artillery was divided into the Mounted Branch (Royal Horse Artillery and Royal Field Artillery) and Dismounted Branch (Royal Garrison Artillery), and the two had different training. Garrison Artillery had more time for individual training, since their units traveled less and did not have to spend time on stables duties. This may have improved their gun drill, but they had even less firing practice than their colleagues. Moreover, their training was less realistic than the field artillery's because it omitted a crucial target category, the "obstacles" that would be an important wartime target. ¹⁰ Some very advanced ideas developed in the RGA, including gun calibration, so that first shots would be more accurate, but here too the lack of a central training authority meant that improved training was the product of an individual crusade by one man, Walter Bland. ¹¹ Siege artillery was specifically criticized for moving and firing slowly, which was unfair judgment since the siege artillery had no assigned horses (civilian carters had to be hired for maneuvers), and since heavy guns always fire more slowly than lighter ones. ¹²

Maneuvers should have put the final polish on training, but there were many difficulties. To save money, many units deployed at half strength, and commanders had to balance the need for simulating realistic movements against the bills for crop damage that would result. ³ Maneuvers were the best chance for joint training with infantry and cavalry, but the cooperation was often a one-way street. To the extent that there was ever official criticism of the artillery for their role in joint maneuvers, the artillery bent over backwards to do what the infantry and cavalry officers wanted. ¹⁴

Initial Wartime Problems

After the outbreak of war, the artillery (like the rest of the army) was faced with two problems. The first was expansion—training larger numbers of men than had ever been contemplated. In this regard the artillery, like other technical arms, was worse off than the infantry. ¹⁵ Guns and other specialized equipment had to be manufactured before the gunners could learn much more than close-order drill. Second, new techniques were developed during the war and had to be

taught to both new and experienced units. Step by step, the Royal Artillery solved its problems, solved the new problems that arose from the original ones, and by the Armistice had produced the most advanced artillery arm of the war.

The first problem posed by expansion was providing equipment for training. Training was hampered by the shell shortage that lasted through 1915, which cut into the amount of firing practice units got, but far more severe was the lack of guns. New Army divisions had very few guns, often well into 1915, months after they were formed. The 13th Division eventually procured one gun per battery, but conversely had "no harness except for a few nearly worn out civilian sets which enabled one battery per brigade to turn out 8 vehicles once a week." ¹⁶ The 18th Division did its unit training in England with a very few guns, fired some borrowed guns a few times on Salisbury Plain, and only received its own guns once the unit reached Le Havre. ¹⁷ So extreme was the shortage of real guns that wooden dummies were used to teach loading drills, and some captured German guns were sent back to England for the New Armies to practice upon. ¹⁸ Artillery also had to be mobile, which mainly meant working with horses. While knowledge of horses was far more widespread in 1914 than it is today, there was no guarantee that the army had put men with the right skills in the right place. Horses also had to be procured and given time to work together, and trained to army commands. All these facets caused problems. The supply of horses also caused problems; one division received some 2,000 head, but most of those needed to be cured of ringworm. ¹⁹ Rumors circulated about a battery getting a team of trained wagon horses that had pulled a milk cart and did not respond to voice commands—the gunners had to clink two shell cases together to provide a facsimile of the clink of milk bottles.

One field artillery brigade simply decided not to overwhelm its raw recruits, and only taught "so much of the team work required in a battery as will permit the whole work of the battery to carry on." ²⁰ There was also the question of who would teach the new gunners their trade. It was one thing to teach men gun drill—albeit difficult enough in the absence of guns—but another to teach, say, observation of fire, and even more difficult to inculcate artillery-infantry co-operation. This problem was not helped by the artillery commanders of the New Army divisions, almost all of whom were retired officers recalled ("dug-out," in the slang of the day) for the emergency. Ivor Maxse was relatively lucky with the CRA he got for the 18th (Eastern) Division. F. G. Stone was only 57 and had been retired less than a year, but Maxse still wanted officers, even as junior as major, to be sent back from France with their up-to-date experience.

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Instead of veteran officers and NCOs, a variety of official publications came back from France so that the new divisions at least would not learn the wrong things. ²² These came from the BEF, and then went through the War Office, a step that very likely slowed dissemination. Some of these also tried to explain new techniques, but it is debatable how useful they were to officers still grappling with the rudiments of army life, let alone ballistics. ²³ There was also a cottage industry of books and pamphlets written by serving or retired officers, purporting to tell new gunner officers all they needed to know. *A Field Gunner's Catechism* ran to at least nine editions, while almost anything subtitled "a simple explanation" was a commercial success. ²⁴ Of course publishers also reprinted official works, but it would be interesting to

know which sold better, *Garrison Artillery Training, vol. II: Siege and Movable Armaments or The Royal Artillery and their Daring Deeds*.

The Territorial Force presented another set of problems. While the men were generally well trained at the individual and battery level, thanks to drill evenings and weekends, they had very little firing experience. Their summer practice camps were short, and a good part of that time was spent in dealing with the horses which, to save money, were only rented. This had led to some interesting experiments with gun tractors instead of horses, but these stopped in 1914. ²⁵ In addition, the Territorial Force's guns were out of date and required different training than the modern ones, and the organization of TF batteries was different from that of the rest of the army. Meanwhile, second-line Territorial divisions, raised in wartime, were as lacking in experience as anyone in the New Armies. Rather than using modern captured German equipment for training, they received some antiquated French black-powder guns that really only taught which end of a gun was which. ²⁶

The RGA had even more problems, because they had to undergo more technical training, they lacked peacetime experience with horses, and because large guns were slower to make. One siege battery fired only a few shots from obsolete 8-inch muzzle-loading guns before going to France, and well into 1916 at least one cadet school still had only ancient guns. ²⁷ Another battery learned drill "on a howitzer represented by two gunners standing like the fore and hind legs of a pantomime elephant. Other apparatus consisted of a blackboard borrowed from Piershill School, a No.1 director from the RFA, 12 semaphore flags from the Boy Scouts, and a buzzer from the camp Adjutant." ²⁸ To be fair to the authorities that were struggling to equip the whole army, this was a tongue-in-cheek depiction. Most of the men in this battery had already done individual training in other units before being drafted away to the new unit, and the battery received up-to-date equipment before it embarked for France.

Training Officers

To provide officers, the Royal Military College at Woolwich (the training center for artillery and engineer officers) shortened its training course. But even that was far from enough, and other existing schools were pressed into service. RFA officers went to Shoeburyness, which was originally the school for instructors who would be sent out to spread their knowledge throughout the army. Now the situation was urgent, and Shoeburyness dumbed down its course. Lest we think that leading young lieutenants to knowledge made them think, there were complaints from the young gentlemen that they were being taught old-fashioned mobile warfare, not the latest trench-warfare tactics. ²⁹ RGA officers went on very short courses to Lydd (the pre-war RGA school), but both that school and the RGA were expanding from an even smaller base than the RFA. ³⁰ Quickly, Woolwich, Shoeburyness, and Lydd were all swamped, and ever more officers needed training. Eventually a large number of Officer Candidate Schools were opened, with twenty-five existing at various times, but because these were ephemeral, hostilities-only organizations, virtually no details have survived about the number of schools, the course of instruction, or any other specifics. ³¹

Even with the burgeoning training establishment, junior officer training was still identified as deficient even before divisions deployed from the UK to the Western Front. Beginning in the early spring of 1915, extra subalterns were attached to batteries in the line to get two weeks' seasoning. ³² Similarly, a "school training battery" was established near St. Pol in an attempt to fill some educational gaps among officers already in action. ³³ The situation persisted throughout the war, with some officers sent to France with only eight months training, which included their Officers' Training Course. ³⁴ Interestingly, when sergeants were granted commissions they were given nearly a year of training. ³⁵ This may have reflected concerns about the social origins of these new officers, or may have been a recognition of the lower educational

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As ever, men's time and effort were often wasted because the army could not predict the future. For example, A. D. Somervail joined the Territorial Force in January 1915 and was taught about 5-inch howitzers, which were then withdrawn from service, so he was retrained on 4.5-inch howitzers. The army then preferred that he learn about 18-pounders, so he attended two courses about them. He then went on a course vaguely called "Telephone and Artillery Material" before finally going to France in May 1917, relatively well trained for his duties. ³⁶ Staff officers might well be sent to schools to learn facets of their trade, like the Reconnaissance Officer who went to the Survey School, or those staff officers considered for promotion to command units who would go on standard command courses. ³⁷ However cursory an officer's initial training might be, more care was taken with those promoted to be a Battery Commander. They typically went on a course teaching administration and man-management, then another to improve their gunnery skills. ³⁸

Given the difficulties and wide variations in training, new divisions in France were often given a leavening of Regular artillery troops, or perhaps (and temporarily) a Regular CRA. ³⁹ This helped the new divisions, whose entire firing experience might have been only a few dozen rounds. There was also a program to gently break in new divisions. For instance, in December 1915 the 38th Division (a New Army formation) sent its batteries, one at a time, to join the Regulars of the 5th Division. ⁴⁰ Through the spring of 1916, New Army and Territorial Force artillery doubled up with regular units in the line to improve their standard of training. ⁴¹ Royal Horse Artillery batteries were specially chosen to train the new units because of the RHA's high standard of drill and discipline; the RHA also supplied many of the demonstration batteries for schools in France. (It is only fair to point out that while the cavalry did not see much action in World War I, the RHA batteries were frequently detached and saw considerable service and action.) The 39th Division arrived in France in March 1916, only ten months after its creation, and within a week the artillery were already attached to divisions in the line. Perhaps this unit was especially backward, but it served two apprenticeships in its first month, sometimes attached to divisions that had only arrived three or four months earlier. It then served three months in a quiet sector and had a further ten days training behind the lines before first entering battle. ⁴²

But such was the number of semi-trained units that, regardless of the quality of the instructors, they could not learn all they needed to in brief spells in the line. Furthermore, they needed to raise their standard of individual training. At different times, schools trained individuals, units,

or both, and the tasks might be spread across different schools or handled at one large school.

To fill the gap, training schools were created on the Western Front. At first there was considerable diversity in schools, whether established by divisions, corps, or armies (sometimes all three), but in early 1916 artillery topics were assigned to the army-level schools. ⁴³ The system was highly variable, and records are scarce since none of the schools had formal establishments. After the 1915 campaigning season, GHQ took the first steps to extend officer training in France. ⁴⁴ Memos circulated in early October, resulting in each army establishing a school slightly before the War Office officially authorized their creation. ⁴⁵

As befitted the decentralized style of command, GHQ only explained the general subjects the schools should teach, leaving the actual syllabus to the armies. Each school had a battery for demonstrations, and plans were to train twenty officers per twelve-day course. The First Army started a week-long course for battery commanders (as well as a scattering of staff officers) late in December 1915. ⁴⁶ The First Army seem to have been the leaders in formal artillery schools, although artillery was part of the syllabus at the Third Army's less-focused Officers School. When Lieutenant Colonel Tudor gave an evening lecture (apparently an outgrowth of the Officers School) on the lessons of Loos he discussed not only artillery matters but also such details as the advantages of wide communications trenches. ⁴⁷ The Third Army did have an Artillery School but, lacking guidance from above, in February 1916 it only taught FAT and open-warfare methods. ⁴⁸ The Second Army started a two-week-long artillery course at roughly the same time and went beyond pure gunnery to tactics and man-management. ⁴⁹

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By the middle of the Somme fighting, the number of gunners needing training was so great that schools had to be expanded to teach sixty officers and sixty NCOs per course, and in March 1917 overcrowded schools in Britain sent half-trained subalterns to France to finish their training at the army schools. The schools ran continuously until more urgent matters intervened, in the form of the German offensives in the spring of 1918. Afterwards there was a gradual re-opening, but due to the pace of operations, some schools were closed; short-handed units could not spare men for extra training and, overall, the need for schools had declined. Attention turned to plans for a central artillery school, thanks largely to the personal involvement of Herbert Uniacke, now the Deputy Inspector General of Training. He won the point, but only on 19 October, and after the Armistice only establishments in Britain were considered for the future school. ⁵⁰

There seems to have been very little liaison between the Allies on training. British officers generally noted a higher standard of drill in French units, because the French had many more regulars, even after wartime dilution. The lack of co-ordination largely stemmed from the existence of quite different weapons rather than different techniques. The French placed more reliance upon high-velocity guns, while the British added more and more howitzers. In addition, the French used the metric system, thus many details of their equipment, from fuze-setting machines to breech mechanisms, were different from British equipment and thus cross-training would have been of little benefit. Nor was there much contact with the Americans. American field artillery was equipped with French 75s, but with British heavy pieces (excepting a few railway guns shipped from the U.S.), and the French handled most training.

The Americans did approach the BEF for lessons and experience, but these interactions tended to be turned into journal articles for reading in the U.S. rather than for any direct application in France.

Schools mainly trained individuals, but there was still a need to improve the standard of training in entire units. To do this, quite early in the war training areas were established behind the line. ⁵¹ Sometimes, quite reasonably, schools were located in these training areas. In November 1915 there was already an "Artillery School Havemas," but unit training only burgeoned the next winter. ⁵² In January 1917, the "Training Area Calais" was big enough for three field batteries and a heavy artillery group, while the Second Army trained a whole field brigade and VIII Corps exercised two field brigades. ⁵³ It was during this winter that divisional schools faded, replaced by corps schools such as XIV Corps and ANZAC schools, offering two- or three-week courses. ⁵⁴ But the situation was still fluid enough that some divisional schools were still operating, and even inviting their neighbors to join. ⁵⁵ This focus on corps schools was the product of GHQ policy laid down in General Staff Circular 29, which encouraged a new uniformity of training and also established shooting ranges for practical instruction. ⁵⁶ Army-level schools continued their work throughout 1917, with the Second Army attaching enough importance to training (and perhaps the relative rest it entailed) to keep their school open during Third Ypres. ⁵⁷ The winter of 1917-18 saw no great changes, although now some formations urged training even in the line: conducting individual training was judged possible in the line, while batteries and brigades in reserve could train as complete units. ⁵⁸ The greater number of units in reserve facilitated training even into 1918, when units earmarked as mobile reserves used their time to train. ⁵⁹ This was unstated but clearly official policy, and the mobile reserves especially brushed up their mobile training, which was so necessary for the new defensive doctrine and offensive hopes.

What to Teach

Many early schools spent less time teaching a syllabus than bringing officers from the different branches of service together to learn about each others' problems and ideas. GHQ established a course at Aire that produced a variety of good ideas (including a version of the creeping barrage), but no such gathering of officers had the authority to make their findings official army policy. The Aire course's notes were marked "These notes are not official" at the same time that the BEF was relying on GHQ's useful but uninspiring "Tactical Notes" series. ⁶⁰ Any ideas produced had to go through the General Staff's bulging in-box until mid-1918, when Sir Ivor Maxse was appointed Inspector-General of Training. Maxse interpreted his job to include deciding what should be taught as well as how to teach it.

Without an internal proponent for artillery doctrine, GHQ had to consult the armies for ideas. While this doubtless brought forward many new ideas, when there was disagreement it tended to produce lowest-common-denominator results. ⁶¹ By late 1916 schools had become an accepted part of the BEF, and in 1917 and 1918 training syllabi were officially printed for use across the BEF. The first was "Instructions for the Training of British Armies in France," followed by the "Catechism for Heavy and Siege Artillery Subalterns," later broadened into a "Catechism for Artillery Officers." ⁶² (Available as [Appendix 25](#).) Whatever the centralizing

intentions, the courses of instruction at the various schools differed. Despite the optimism of one instructor that he was teaching his pupils "the latest ideas in gunnery and [giving] them some training in mobile warfare," some pupils simply saw the schools as a break from the front and a chance to "give us a change." ⁶³ Furthermore, regardless of the industry of officers who could take 112 pages of notes during a ten-day course, it was possible for superiors to grumble, "what proportion of Battery Commanders have ever seen a text book of Gunnery?" ⁶⁴

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Yet at the highest levels there was concern about splitting the artillery, separating technical and tactical training. The feeling was that the artillery had swung too far into technical matters of gunnery and was neglecting the development of new tactics to support the combat arms. But these complaints were not coming from infantry or cavalry officers who were feeling abandoned—they came from senior artillery officers. Arthur Holland, himself no stick in the mud about technical gunnery, wrote Birch, "The Siege Schools are also run on the wrong lines. They do not seem to be able to realise that Siege Batteries (the name is misleading) are a portion of the Field Army and must be prepared to act and think quickly without any loss of accuracy...." ⁶⁵ As the war drew to a close and there was the opportunity to look to the future, Birch himself contemplated how things might be reshaped. He knew the strengths of both garrison and field artillery and wanted to combine their strengths; as a horse artilleryman himself, he may be permitted to think that the garrison artillery had more room for improvement:

One of the great drawbacks in this war has been the want of any tactical knowledge or training on the part of officers of the Garrison Artillery, and as long as they remain a separate branch this want of knowledge and experience is bound to happen again. Furthermore, the very life of a Garrison Artillery officer in peace tends to mental and bodily deterioration. ⁶⁶

That same lament about training shortcomings could have been applied to the pre-war army as well, and it is remarkable how thoroughly technical the BEF became. Before the war, an officer was laughed at for suggesting that a battery carry a thermometer and barometer in the field; even telescopes were not standard equipment, and their use was considered somewhat underhanded. ⁶⁷ In the very first paragraph of *Modern Artillery in the Field* Henry Bethell dismissed "theoretical subjects" such as ballistics in favor of "such information as will be of practical use." ⁶⁸ This changed quickly. In 1915, every battery and brigade had a telescope, and slide-rules and anemometers were being issued as well. ⁶⁹ The most impressive feature of artillery training was that an organization previously so ambivalent about technical gunnery could not only transform itself, but could do this while absorbing enormous numbers of men who knew nothing whatsoever about ballistics or gunnery or tactics or horses.

Furthermore, because the state of the art was constantly improving, it was not just a question of training the new men up to the level of 1914. At the end of June 1915, the Royal Flying Corps offered meteorological data to the artillery, but du Cane, the MGRA at GHQ, had to decline, saying, "we cannot make any use of this information." ⁷⁰ This response has sometimes been held up for ridicule, suggesting that the Royal Artillery did not want the information, but at the time it was only stating the truth. ⁷¹ Sufficient technical proficiency to handle meteorological corrections had not yet arrived. John du Cane was not sticking his head in the sand: in mid-

1915 it could not be used, but in 1916 such information had percolated into the artillery, and by 1917 it permeated everything gunners did. 1915 did see some technical instruction: the Royal Artillery was having to deal with new ammunition, which frequently required laying with a false range (if a shell weighed more or less than the pre-war standard, or had a different length, it threw off the standard range tables), and there were attempts made at calibration for muzzle velocity. ⁷² Calibration would substantially increase first round accuracy, and thus reduce the waste of shells, a major concern in 1915; the opportunities it brought for surprise attacks would be recognized later. In 1916 the "Artillery Notes" series amplified and superseded much that had gone before, which helped the artillery with its technical training. But the artillery still had to explain itself to the infantry, and so the very first of the new artillery pamphlets explained to the infantry why some shells would always fall short. ⁷³ 1917 built carefully upon the experience of 1916, including one pamphlet aimed directly at all the officers who had been confused by their first "Meteor" telegram (SS149, "Notes on Meteorological Telegrams to the Artillery"). ⁷⁴ This pamphlet opened soothingly, saying that, "The following Notes are intended to meet difficulties which Artillery Officers have felt and experienced in connection with Meteorological Reports issued to them," and then gently explained what to do. Throughout 1917 and 1918 training became increasingly technical, although never neglecting other duties such as horse- and man- management.

These, combined with schools, training areas, and front-line experience, had their effect. The artillery reached an adequate technical standard and, given all they were trying to do, 'adequate' really meant 'high.' By 1917 there had been a huge increase in the technical skills of the artillery. A battery would be assigned a target, and the battery officers would calculate the basic range and bearing, and some weather-related adjustments. The officers then passed that information to the individual gun detachments. The Number 1 of each gun, a sergeant, would then factor in the muzzle velocity of his particular gun, charge temperature, remaining weather effects (like air temperature, barometric pressure, and wind direction and velocity), and the effects of non-standard propellant and shell weights. ⁷⁵ This was a 180-degree change from the artillery of 1914, which preferred to open fire and see where the shells hit, then adjust the fire by guesswork. Another indication of the permeation of technical gunnery skills was appearance of a standard army form to record individual ranges and fuse settings for each lift and switch for each gun in a barrage (Army Form W3981, "Barrage Table for No_ Gun)." ⁷⁶

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By 1918, the range of courses burgeoned to include exotic subjects like using captured German guns. ⁷⁷ This was in addition to the usual range of classes on technical training and scientific gunnery, subjects that so dominated syllabi that complaints arose that officers were becoming better technicians than tacticians. ⁷⁸ After the appointment of the Inspector-General of Training (IGT), artillery training became still more systematized, although it would be difficult to say that it improved markedly. The standard was already very good, and the time available to the IGT was too limited to make much difference. However, several suggestions were adopted which did result in improved training after World War I.

Artillery training was the province of Herbert Uniacke, an efficient organizer and Deputy Inspector General of Training. He did not greatly change programs of training, but having an IGT made for quicker reactions to the changing circumstances of war. Thus a school instructor

could write:

We were concentrating chiefly on open warfare tactics and tried to make young officers realize that FAT, the gunner's Bible, was still as correct and up-to-date as the day on which it was written. No easy matter trying to dispel the clinging miasma of siege warfare conditions. General Uniacke spent much of his time at the school, and under his guidance you may be sure that the instruction was thorough and up-to-date. [Uniacke] has long been desirous of starting one great central school for Colonels and Battery Commanders in which every Artillery subject is taught, and also a Northern and Southern School for junior officers. By doing away with Army Schools, uniformity of instruction would at last be secured, and that is greatly needed. Only too often instructors will not stick to THE BOOK, but teach fancy systems of their own—very fancy they often are, and confusing to young officers going from one school to another. ⁷⁹

In 1918, a larger percentage of the BEF than hitherto was in training, and Uniacke made sure that the latest artillery ideas were circulated rapidly, not even waiting to produce full SS pamphlets but instead reviving "Notes on Recent Fighting." ⁸⁰ While these were inadequate in 1914 and 1915 (it would have been better teaching teach raw artillerymen gunnery rather than leapfrogging to tactics), by 1918 the army had enough experience to add new levels of sophistication. Frequently the IGT urged the use of *Field Service Regulations or Field Artillery Training* to deal with mobile fighting; the repetition of this theme suggests the lesson was not always getting through. ⁸¹ By September, Uniacke was so vexed that he proposed a school solely to teach open warfare to battery and brigade commanders alike. ⁸² Armies urged the teaching of mobile warfare tactics, but it could sound extraordinarily old-fashioned, as when the Third Army encouraged "the inculcation of the old Regimental system." ⁸³ IGT and GHQ spent considerable time and effort probing the experiences of the fighting units, something that to the recipients must have looked mightily like badgering. ⁸⁴

Another strand of training in 1918 was the continuing stream of technical information sent to all units. As with the "Notes on Recent Fighting," the BEF was now sufficiently experienced to absorb these details within the division. There was no need for entire units to go to a school, as the gradual turnover of personnel was sufficient. Reinforcing this picture of a thoroughly trained artillery, when the 52nd (Lowland) Division was transferred from Palestine to the more complex theater of the Western Front, the whole division was put through nine weeks of training. This was a longer training period than that given to the remnants of divisions chewed up during the German spring offensives, because those battered divisions had a higher training level than the troops in Palestine. ⁸⁵

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Thus in 1918 the schools were less important, largely because they had already done their work. In previous years the schools had been closed during the campaigning season, but in 1918 they stayed open to continue training personnel. However, just as much instruction was done by the batteries themselves (while they were in reserve), based on GHQ and IGT pamphlets. The level of training of battery officers and NCOs had reached the point where they could absorb improvements quickly and on their own rather than needing everything to be demonstrated at schools. IGT built on a solid foundation, and primarily encouraged,

standardized, and fine-tuned already existing training methods.

Larkhill

The most important single school was not even part of the BEF, but was located at Larkhill in Wiltshire. ⁸⁶ At the beginning of the war Larkhill was not even a school but simply a series of practice ranges that had been established in 1899. The ranges remained in use, and many New Army gunners would fire their first rounds at Larkhill a few days before embarking for France. Over the winter of 1914-15, various Dominion units quartered on Salisbury Plain trained at Larkhill, which led to the first buildings being erected and may also have contributed to the unusual name it received, the "Overseas Artillery School." The first step in creating something more substantial was a February 1915 Army Council order that foresaw the eventual move of the School of Gunnery from Shoeburyness to Larkhill, especially as the Shoeburyness school already migrated to Larkhill for the summer practice season. But in the interim Shoeburyness continued to operate while the new school opened at Larkhill; doubtless the volume of students to be trained necessitated using both. ⁸⁷ The faculty was quite small—only seven men—and the course was more demonstrations than hands-on practice for the students. (Because it was only a demonstration course, the faculty never expanded.) ⁸⁸

It ran two courses, one for men to be promoted to battery commander, the other for lieutenant colonels who were prospective brigade commanders. The battery commanders had a week's lectures at Shoeburyness and then a week at Larkhill, but the lieutenant colonels spent all their time at Larkhill. ⁸⁹

Larkhill's staff was of a high caliber, a feature that would remain true throughout the war. The first Chief Instructor was Lieutenant Colonel (later Brigadier-General) Walter Ellershaw, transferred a few miles from Netheravon where he was commanding a school for air-artillery co-operation. He had commanded a battery early in the war, and would rise to command the heavy artillery of three different corps. ⁹⁰ The first director of experiments (a post officially established only in 1918) had been CRA of two divisions and would return to a third, and the camp's first commandant would move on to be the CRA of two divisions. ⁹¹ Perhaps the strongest indication of the importance attached to Larkhill was the commandant during the second winter of its existence. ⁹² Brigadier-General Bertram Kirwan had been an instructor at the School of Horse and Field Artillery before the war, then an artillery staff officer at GHQ, a CRA during the Somme fighting, and immediately after his winter at Larkhill he returned to France to command XV Corps' artillery until the end of the war, earning Haig's approbation. ⁹³ Larkhill was important enough that Kirwan was relieved a month before the school received its first pupils, as he had to assemble instructors and revise the syllabus. Kirwan wrote a syllabus, which suggests that the previous winter's courses had been unimaginative and old-fashioned; he apparently also had to co-ordinate the split course with Lydd. Kirwan took his duties seriously, and mid-way through his posting at Larkhill he toured the Western Front with his chief instructor, explaining his work and asking for advice. Perhaps because of this profile-raising tour, various CRAs, CHAs, and BGRAs turned up to watch for a few days. ⁹⁴

Kirwan made Larkhill a 'center of excellence,' testing various methods of ranging, wire-cutting, and creeping barrages, although some observers dryly noted that school results were better than those experienced under field conditions. ⁹⁵ Even demonstration barrages would become 'ragged' after only twenty minutes, which suggests that the infantry were frequently right when complaining about short rounds. But Larkhill's experiments worked to improve this, and the range tables were revised so gunners could trust them rather than having to guess what changes they needed to make to handle new propellants and new shells. Better data let the artillery in the field do a better job. The technical work Kirwan did at Larkhill was the basis for GHQ's first series of Artillery Circulars, and after his promotion to XV Corps Kirwan kept at his technical work, circulating calibration statistics worked out from practical experience. ⁹⁶ The importance of Larkhill to technical gunnery is apparent through the cycle of the "Artillery Circulars." These publications appeared during Larkhill's second season, disappeared during the summer of 1917, and returned when the school resumed; the series then lapsed again until the IGT revived it. While Kirwan was researching and publishing, he found that the troops in the field were not necessarily absorbing his work. Doubtless many gave the Circulars the standard reception for apparently unnecessary paperwork.

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Larkhill seems to have gone into suspended animation during the campaigning seasons of 1916 and 1917, but again during the winter of 1917-18 it returned to life with field trials, especially in wire-cutting. ⁹⁷ One subject Kirwan wanted to study was shell effectiveness—, things like blast patterns, lethal radii, relative lethality, and the like. This would allow officers designing bombardments and barrages to know what shells to pick for different purposes, including the tricky question of the creeping barrage. Opinion differed because it had to perform two tasks: kill or suppress the Germans, but not kill or suppress the British infantryman who were almost as close. It appears this was too ambitious a topic, since no pamphlet on the topic appeared in contemporary publication lists. The closest that anyone came was GHQ keeping a file on the topic, and that was started after Kirwan raised the subject at Larkhill. ⁹⁸

After Kirwan's season, Larkhill declined in importance, but largely because he had done so much valuable work. ⁹⁹ The next commandant, Brigadier-General Sydney Metcalfe, ¹⁰⁰ drummed up less publicity for the school (and himself), but very probably the number of students did not fall from the 1,900 recorded over the winter 1916-17. ¹⁰¹ (Kirwan had squeezed in 58 percent more than the 1,200 planned.) GHQ wanted as many officers as possible taught at Larkhill, although the Passchendaele battles kept many officers in Flanders over a month longer than expected. ¹⁰² The War Office now believed in the good work Larkhill was doing and wanted to keep it open throughout the campaigning season of 1918, although with fewer students than during the winter lulls, but the pace of the fighting made this impossible. In light of the decision to finally create a central artillery school, Larkhill was revived after the Armistice for the same courses, but only for officers intending to stay in the army. ¹⁰³

Larkhill was also important in the early development of sound ranging, although independent innovators in France had made the key breakthrough. ¹⁰⁴ Once the method had been perfected, its operating limits were determined by experiments at Larkhill and then circulated through the BEF. Kirwan seems to have been the first to spot the possibility of using sound ranging

equipment to calibrate guns, a critical innovation. ¹⁰⁵ Other technical developments were tested at Larkhill, perhaps the most notable being smoke shells, the first batches of which were fired at Larkhill in the summer of 1916. The school's commander was effectively given responsibility to decide from the various experimental batches what the army would use. ¹⁰⁶

Experimentation was a fairly common activity at some of the permanent installations in Britain. Early in the war some field tests were done in France, mainly testing munitions that were performing badly. When the new "Amatol" high explosive filling was tried, many "blinds" (duds) and premature explosions (either in the barrel of the gun or behind friendly lines) were reported, which led to trials outside Calais that confirmed the problem. Results were then relayed back to the Master General of the Ordnance (MGO) in London. ¹⁰⁷ Anything done in France, or even at a school, was outside the "usual channels" of the Ordnance Committee, but the MGO (Major-General Stanley von Donop) realized the urgency of the situation and operated flexibly. Officers in the field forwarded their complaints through GHQ to the MGO, where the reports were collated as a first step toward determining the problem. Then over 8,000 shells (no small number during the shell shortage) were fired at Shoeburyness to determine the causes of the premature explosions. ¹⁰⁸ The problems were found to be with the fuses and gaines (boosters to amplify the fuze's explosion and detonate the main charge), and the results were reported to GHQ as well as the War Office.

Another area where schools tried to integrate existing technologies was with aeroplanes. Almost immediately after the fighting began, gunners realized aeroplanes could provide observation and correction for artillery fire, but co-ordination of this activity was sketchy. Many called for the use of wireless telegraphy, ¹⁰⁹ but the earliest tests were with simpler methods, such as light signals and pyrotechnics, and took place around Larkhill in early November 1914. ¹¹⁰ (There was also a special artillery-aircraft co-operation school at Netheravon early in the war.) The rapid pace of developments in aeroplanes, wireless equipment, and artillery technique meant that most experimentation took place at the front, but results and methods were frequently circulated to the artillery and the army as a whole. Indeed, over twenty specific pamphlets and notes were issued by the General Staff regarding aerial co-operation in addition to mentions in more general publications. By the end of the war almost all artillery publications dealt with aeroplanes in some fashion.

Within the System

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Had there been an official intention to change the fundamental principles of the British army, or the Royal Artillery as part of the British army, then it would have involved training and schools. Simply put, troops would have required retraining. Furthermore, if the artillery had its own agenda to change its role in the army it would have had to do so via re-training men and units. That did not happen, even while training methods and content changed substantially. Instead, the training program worked to make the artillery as efficient as possible regardless of the tactical plans, leaving improvement on tactics for later. It was under Haig's command that GHQ recast training, and therefore the responsibility was his.

Before the war Haig had overseen the writing of *Field Service Regulations*, which was meant to be the keystone of army doctrine, drawing together the various component arms and branches into a coherent whole greater than the sum of its parts. During the conference that decided on *FSR's* acceptance, one member of the Army Council made great fun of the proposals, picking out problems here and there. This enraged Haig, who sensibly retorted that a system was needed and if the proposals proved inadequate they could be improved upon, but that without a system everything would be haphazard. ¹¹¹ In implementing a system, however imperfect, Haig was living up to his training as a staff officer. During the first years of the war the doctrinal system languished mainly because Sir John French was not a trained staff officer and did not create the mechanisms needed to benefit from experience.

The New Army and Territorial Force divisions training in Britain were most in need of guidance, but they were only fed scraps. The idealistic flower of British manhood had an immense fund of respect for the Regular Army. They willingly accepted the chaotic conditions of training, the lack of equipment, and assorted discomforts of military life in order to 'do their bit.' They avidly followed any news of the war and threw themselves into following whatever orders the often aged and decrepit instructors gave. However, this was a nation in arms and it was better-educated and more intelligent than previous British armies. While generally trusting that their training was appropriate, they yearned to be taught what they saw as the most up-to-date subject, trench warfare. It did not really enter their minds that the Regular Army had no understanding of trench warfare. A shortage of official ideas led to a flowering of unofficial material on the 'new' warfare. Unfortunately, much of what was coming back from France described trench warfare in terms of how it differed from *Field Service Regulations*, *Infantry Training*, or *Field Artillery Training*, and since the troops in Britain had not mastered those manuals they could hardly grasp the ways that trench warfare was different. Ideally a training program would have either focused on pre-war methods as a basis for later advanced training or trained the home forces for trench warfare. Because French's GHQ never grasped this dichotomy, training was a hodgepodge.

The unofficial manuals only sprang up because the army provided nothing. Trench warfare was as exotic as any of the adaptations to 'normal' rules required by colonial campaigns, the "small wars" that had their own rules. ¹¹² Some officers grappled with the very concept 'trench warfare,' wondering if it were perhaps really a siege writ large (and therefore soluble through siege techniques), or it were perhaps not so different from normal warfare that a mix of perseverance and adaptation would see through, instead of a new form of warfare that would require entirely new methods. Combined with the immense organizational changes required by a constantly growing army, the BEF lacked disciplined thinking at its head. It muddled through 1915 without reaching a conscious decision, and this indecision hampered training.

With higher headquarters providing no guidance about how the war should be fought, Regular Army units also suffered from the lack of central direction. Trench warfare became an excuse for every unit to do things differently; after all, the official line effectively encouraged local initiatives. What advice did percolate back from GHQ, via the War Office, to units training in England was about the minutiae of trench warfare: reliefs, sentries, bombing parties, and sapping. It did not address how artillery and infantry should work together or how artillery

should handle semi-independent operations.

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Upon Haig's promotion to command of the entire BEF he began remedying the situation. The Army Printing Services began printing thousands upon thousands of copies of pamphlets covering not just these details of military life and organization, but looking beyond, to the army's actual purpose—fighting. Compared with the sophisticated planning guides and tactical instructions that came later, the first generation of pamphlets was distinctly amateur. Some officers later sneered at this first generation, but probably did not stop and think how much they improved upon the status quo. Even by mid-1916, at the start of the Somme offensive, most divisions in the BEF had not yet fought in a major battle. Green divisions arrived on the Western Front even into 1917. If this force were to be brought to any level of inter-operability they had to have a common base of knowledge beyond *Infantry Training*. As Haig had said, it was better to have a perfectible system than no system at all.

Until mid-1918, when the IGT took control, these pamphlets were the product of the General Staff. The various arms were in charge of their own detailed training, but each focused on what they needed to know in order to fit into a greater whole. Artillery learned how to improve, for instance, their accuracy, but at the same time they were told how best to use that accuracy to aid the combat troops.

The multitude of CDS and SS (here standing for nothing more sinister than Stationary Services) pamphlets should be seen in this light. The great bulk of these were, either specifically or broadly, for training purposes, and the rest were mainly intelligence material, primarily translations of German documents. At the beginning of the war there was little differentiation among the pamphlets, which simply contained whatever tactical details had been learned in the time it took to fill a few pages. These were clearly intended for home consumption. The title was "Notes from the Front," and at the time the British front was small enough that the whole BEF was experiencing the same conditions and did not need to be kept abreast of events in other sectors of the line. ¹¹³ However, units at home needed to learn the differences between war as described in *Field Service Regulations* and the new reality. Later new weapons sparked flurries of pamphlets: first came explanations of the new technology, then tactical suggestions were relayed after the initial use, and eventually the tactics were refined. ¹¹⁴

As the war settled down and the BEF expanded, not just in numbers but in frontage as well, there were new pressures. First, the BEF was no longer homogenous. Territorial Force divisions, the Indian Corps, Dominion units, and eventually the Kitchener Armies all had different levels of training and equipment, and all had to be fitted into the BEF. Second, the state of the art was constantly changing, not only as armies grappled with the surprises of trench warfare but also as trench warfare itself evolved. Third, as the British front lengthened the differences along the front increased. Different tactics evolved in different areas, but since only part of the BEF would be engaged at any one time there was also a need to spread lessons within the BEF. There was a quest for ideas from the French, but these were generally more abstract operational or strategic concepts, as the BEF trusted to its own tactical lessons. ¹¹⁵ Gradually, there appeared specialist pamphlets for most of the combat arms, the cores of which

would be extracted for further pamphlets advising the staff how best to plan operations. As an example, the 1916 artillery pamphlets were essentially stand-alone publications, but in 1917 the first words of "Artillery in Offensive Operations" said that that manual should be studied together with infantry manuals, and many sections were derived from the divisional (combined-arms) manual.

As the BEF learned the business of trench warfare, the nature of SS pamphlets changed. Not until 1916 did a comprehensive set explain the most advanced British ideas throughout the entire BEF, and many units treated these as advice rather than instructions. In 1917 and 1918 there was far more assertiveness from above, because the Somme offensive had shown the need for greater uniformity of training. Yet GHQ matched the quest for uniform training with a desire to seek new ideas (at least at the tactical level) that could then be spread across the BEF.

Conclusion

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Artillery training followed a course parallel to developments within the whole army. The first priority was training the men, and every effort went into meeting it. This led to remedial work once partially trained units arrived at the front, pulled there by the political and strategic need to deploy as fully and as quickly as possible. Gradually the quality of training improved, and kept up with the increasing technological sophistication of the artilleryman's trade. Schools served both to train individuals and to push the bounds of technology. This was not the role that was intended for them, but brighter lights saw what was happening and enthusiastically encouraged it. Once the men were trained—not really until well into 1917—it was time to train whole units. Unit training stressed mobile operations, seemingly a backward step during trench warfare. Yet the gunners already knew most of the technical questions of gunnery, and also trench-warfare methods; their main weakness was mobility. By the end of the war this too was improving, and the infrastructure that had built a large, well-trained force was retained. Through the entire war training emphasized the artillery playing a supporting role relative to the combat arms. Overall, however, this was more due to simple omission than to any explicit effort; the Royal Artillery never tried to revolutionize tactics. There were many cases where the artillery was told to cooperate with the infantry, as in "Artillery in Offensive Operations." The Royal Artillery's first priority was improving its technical abilities so it could fulfill the goals that had been set for it. Once it reached that goal, artillerymen began suggesting better ways for the artillery to help the combined-arms team, but always from the standpoint of a supporting player.

Notes:

Note 1: Quoted in Bidwell, *Gunners at War*, 134. [Back](#).

Note 2: S. C. M. Archibald papers, IWM, 69. [Back](#).

Note 3: At one point, 60-pounder batteries were pleased to see a reduction in their allowance, because it meant replacing feeble practice shells with the real thing. Headlam, *History*, vol. II, 220. [Back](#).

Note 4: Bingham "1913 Practice Camps," 482. [Back](#).

Note 5: *Headlam, History*, vol. II, 168. [Back](#).

Note 6: F. R. Bingham "Practice Camps, 1912, and the lessons to be learned from them," *JRA* 39:11 (1913): 422; Haig to Kiggell, 15 June 1911, Kiggell Papers 1/14, LHC. [Back](#).

Note 7: See Anstey galley proofs, 193-4, for Birch's laments. [Back](#).

Note 8: R. H. Towell to Edmonds, no date, CAB45/199. [Back](#).

Note 9: E.g., Herbert Uniacke. Anstey Papers, RAI, letter Birch to Horne, 30 October 1918. [Back](#).

Note 10: *Headlam, History*, vol. II, 249. [Back](#).

Note 11: R. P. Benson to Edmonds, CAB45/116. [Back](#).

Note 12: "Memorandum on Army Training during the Collective Training Period, 1913." I am grateful to Mr. Nick Evans for bringing this and several other related Memoranda to my attention. [Back](#).

Note 13: Sir Aylmer Hunter-Weston papers, NAM 6503-39-18, "Remarks on 1912 manoeuvres." [Back](#).

Note 14: "Memorandum on Army Training, 1912." [Back](#).

Note 15: Peter Simkins' excellent *Kitchener's Army: The Raising of the New Armies 1914-16* (Manchester: Manchester University Press, 1988) unfortunately does not cover artillery training in detail. [Back](#).

Note 16: Sir Webb Gillman papers, RAI military document 1161, box 2, file 11. [Back](#).

Note 17: H. H. Hemming papers, IWM. [Back](#).

Note 18: Director of Ordnance Services, 31 October 1914, WO95/58. [Back](#).

Note 19: H. W. Wiebkin, *A Short History of the 39th (Deptford) Divisional Artillery, 1915-1918* (London: E. G. Berryman, 1923), 5-6. [Back](#).

Note 20: O. C. Williamson Oswald, *Sixty-One, or how some wheels went Round* (London: H. J. Drane, n.d.), 51. [Back](#).

Note 21: Maxse papers, IWM, file 11/1. Stone was also a trained staff officer. Some CRAs were in their sixties. See file 11/2 for examples of artillery training in the 18th Division, which seems to have been largely dominated by Maxse rather than Stone, who may have been wise to get out of the way of his boss, a fire-and-brimstone trainer of men. [Back](#).

Note 22: See *Notes on Artillery in the Present War*, October 1914; and *Further Notes on Artillery in the Present War*, November 1914. Helps papers, IWM. [Back](#).

Note 23: E.g. "Co-operation of Aeroplanes with Artillery," December 1914, WO158/681. [Back](#).

Note 24: A. T. Anderson's *Field Gunner's Catechism*, ninth edition (London: Gale & Polden, 1916); L. E. S. Jackson *The "Why and Wherefore" of Indirect Laying: a simple explanation for Officers, NCOs, and Men* (London: Forester Groom, 1915 and 1916). Anderson was not pleased when, in 1918, the War Office prohibited unofficial handbooks, although the market was drying up and he had already made several hundred pounds, at three pence royalty per copy, which suggests sales in the thousands. A. T. Anderson diary, RAI military document 1301. [Back](#).

Note 25: See Philip Ventham and David Fletcher, *Moving the Guns: The Mechanisation of the Royal Artillery, 1854-1939* (London: HMSO, 1990). [Back](#).

Note 26: Becke, *Order of Battle*, part 2B, (London: HMSO, 1937), appendix 3. [Back](#).

Note 27: M. E. S. Laws, interview 490/6, IWM; C. G. Dennys interview 9876/13, IWM. Well into 1916 Lydd Camp had a training battery of muzzle-loaders and 9.45-inch howitzers left over from the Boer War, the only guns in the Royal Artillery whose breeches opened to the right. Neither was ideal for teaching gun-drill. Anon., *Diary of Eleventh Siege Battery RGA, now Eleventh Howitzer Battery RGA* (Birmingham: n.p., n.d.); Anon., 133 Siege Battery (London: n.p., n.d.); L. F. Penstone, *The History of 76 Siege Battery RGA* (London: S. Tinsley & Co, c. 1938); Anon., *History of 88th Siege Battery Royal Garrison Artillery, December 1 1915 to July 5 1919* (n.p., n.d.). [Back](#).

Note 28: Anon., *14th Heavy Battery RGA War Diary and Roll of Honour* (London: Robert Scott, 1919), p. 4. [Back](#).

Note 29: H. H. Hemming papers, IWM; A. J. W. Harvey, "The School of Artillery," *Army Quarterly* 68:2 (July 1954): 198. [Back](#).

Note 30: M. E. S. Laws, interview 490/6, IWM. [Back](#).

Note 31: J. Ashley, interview 6831/2, IWM. [Back](#).

Note 32: Sandys Diary, February-April 1915. [Back.](#)

Note 33: T. W. Dove, interview 4082/C/A, IWM. [Back.](#)

Note 34: T. H. W. Armstrong, interview 9758/3, IWM. [Back.](#)

Note 35: G. Parker, interview 5047/1, IWM. [Back.](#)

Note 36: I am grateful to Mr. P. L. Somervail for this information about his grandfather. [Back.](#)

Note 37: XIX Corps CHA diary (WO95/968) February 1917; XV Corps BGRA diary (WO95/925) February 1918, XIII Corps BGRA diary (WO95/901) October 1916. [Back.](#)

Note 38: K. H. Cousland, "A Former Gunner of the First World War looks back," LHC. [Back.](#)

Note 39: The First World War Letters of Lieutenant Colonel V. M. Fergusson, IWM, 12 and 13 May 1915, 6 October 1915. In at least one case, the CRA of a new division went to the front before his division, to refresh his knowledge, having been wounded earlier in the year (R. G. Ouseley, of the 59th Division). Hussey Diary, RAI, 14 December 1916. [Back.](#)

Note 40: Hussey Diary, RAI. [Back.](#)

Note 41: R. MacLeod papers, 1/1, LHC. [Back.](#)

Note 42: Wiebkin, *39th Divisional Artillery*, 10-14. [Back.](#)

Note 43: Later corps schools taught some artillery topics. Weber, "Mobile Artillery," 53. [Back.](#)

Note 44: The system of training for infantry officers was reformed at the same time. I am indebted to Dr. Gary Sheffield for this information. [Back.](#)

Note 45: *Rawlins, History*, 245, memos of 8 and 16 October 1915; Headlam Papers 183/2, RAI, 21 October 1915. War Office approval came on 9 November 1915. Virtually all non-anecdotal information on army schools comes from Rawlins. [Back.](#)

Note 46: Headlam Papers, conferences, 26 December 1915. [Back.](#)

Note 47: Tudor Diary, 12 September 1915; Fraser-Tytler, *Field Guns in France*, c. 6 January 1916. Lectures would again play a role in the winter of 1916-17, now supplementing schools, e.g. E. W. Alexander's lecture on counter-battery work in December 1916. XVII Corps CHA diary (WO95/942); Headlam, conferences, 27 November 1916. [Back.](#)

Note 48: Headlam, conferences, 18 February 1916. [Back.](#)

Note 49: R. Smith Diary, 1915-1917, LHC. [Back.](#)

Note 50: *Rawlins, History*, 254. [Back.](#)

Note 51: As these were not proper units, no official diaries survive, only anecdotal material. [Back.](#)

Note 52: XIII Corps BGRA diary (WO95/901) November 1915. [Back.](#)

Note 53: IX Corps BGRA diary, WO95/841, ANZAC CHA diary, WO95/1034, VIII Corps BGRA diary, WO95/824. [Back.](#)

Note 54: XIV Corps BGRA diary (WO95/915) December 1916. [Back.](#)

Note 55: The 6th Division kept theirs open: No. 2 HARG diary (WO95/87) November 1915. [Back.](#)

Note 56: It has not been possible to trace General Staff Circular 29 from the one reference found. It was detailed enough to prompt ANZAC to establish a "Programme of Training for Heavy Artillery, Divisional Artillery Brigades, Sections of Divisional Artillery Columns, and Trench Mortar Batteries out of the Line." ANZAC BGRA diary (WO95/993) December 1916. [Back.](#)

Note 57: IX Corps BGRA diary (WO95/841) July 1917. [Back.](#)

Note 58: ANZAC BGRA diary (WO95/994) November 1917. [Back.](#)

Note 59: XIII Corps BGRA diary (WO95/902) June 1918. [Back.](#)

Note 60: WO33/756, of which only 200 copies were printed, further limiting dissemination. It is available as [Appendix 14](#). "Tactical Notes" also apparently went into remission later in 1915; the last edition seen (WO33/721) is August 1915. [Back.](#)

Note 61: Headlam, conferences, 2, 24, and 31 December 1915, 10 March 1916. Later divisions and corps could write directly to GHQ, expanding the base of experience to draw from and presumably hastening the spread of new methods. Also, suggested changes had to be sent in 'privately,' to avoid admitting that senior officers had no monopoly on wisdom, which must have stifled discussion. [Back.](#)

Note 62: SS152 (June 1917 and January 1918); SS592 (October 1917 and March 1918). The RGA preserved their separate training pamphlet, SS614, "Training Instructions for Siege Artillery" (March and July 1918). [Back.](#)

Note 63: S. C. M. Archibald papers, IWM, p. 132; J. Ashley, interview 6831/2, IWM. [Back.](#)

Note 64: E. G. Angus papers, IWM; S. R. Wason, "Sums in the Field," JRA 45:6 (1918): 189.

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Note 65: Holland to Birch, 29 December 1916, Anstey Papers, RAI. [Back.](#)

Note 66: Birch to Horne, 21 October 1918, Anstey Papers, RAI. Birch was adamant about supporting the combat arms, but was flexible about how to do it. After the war, as Master-General of the Ordnance (MGO), he supported tanks and developed the 'Birch Gun' to work with them. I am grateful to the late Mr. Philip Annis of the RAI for these observations. [Back.](#)

Note 67: Bingham, "1913 Practice Camps," 495. The officer laughed at was Major H. Rowan-Robinson, RGA, who had passed Staff College and was an instructor at Woolwich; those laughing were presumably mostly from the field artillery. [Back.](#)

Note 68: Bethell, *Modern Artillery in the Field*, v. [Back.](#)

Note 69: Director of Ordnance Services (WO95/58), 2 and 28 May 1915; 28 June 1915; 9 August 1915. [Back.](#)

Note 70: Quoted in Farndale, *Western Front*, 372. [Back.](#)

Note 71: Tim Travers, *The Killing Ground: The British Army, the Western Front & the Emergence of Modern Warfare, 1900-1918* (London: Routledge, 1987), 162. [Back.](#)

Note 72: E.g. CDS49 (September 1915), "18pr Correction Scale" for use with the new marks of ammunition. [Back.](#)

Note 73: CDS98/1 (January 1916), "Close Shooting in the Field," superseded CDS30-32, which I have not been able to trace. Similarly, CDS98/2 (January 1916), "Field Artillery Ammunition," brought all the related pamphlets from 1915 together. [Back.](#)

Note 74: Issued in March 1917. [Back.](#)

Note 75: NAM document 6410-42, F.(?) C. Hocking. Hocking's life was saved because he made these calculations in a muddy hole instead of at his gun. [Back.](#)

Note 76: Copies in J. Batten Papers, RAI Military Document 1348. [Back.](#)

Note 77: Headlam papers, file 58; Nicholson, *Canadian Gunners*, 342. Practical advice included filling buffers with soapy water if the Germans had drained the oil. [Back.](#)

Note 78: E.g. the lament of the Third Army's MGRA in June 1918, letter RA/3259, WO95/374. [Back.](#)

Note 79: Fraser-Tytler, *Field Guns in France*, 24 April 1918. Fraser-Tytler taught at the Fifth Army Artillery School. When the Fifth Army was disbanded, Uniacke delayed the Fourth Army from stealing his old school, but lost it when his back was turned during a brief trip home. Uniacke Diary 1918, RAI. [Back](#).

Note 80: There were eventually nineteen Notes, not all concerned with artillery. [Back](#).

Note 81: See Uniacke papers, U/I and U/II, RAI. [Back](#).

Note 82: Uniacke papers, U/I/8. [Back](#).

Note 83: Third Army letter RA/3259, 17 June 1918, WO95/374. It would have been a challenge for the many officers who had never experienced the "old Regimental system" to inculcate it. [Back](#).

Note 84: Uniacke papers, RAI, U/III. Some of these reports were collected before the IGT was established, presumably by GHQ. [Back](#).

Note 85: E. A. James Papers, IWM. I am obliged to Mr. Andy Simpson for this material. [Back](#).

Note 86: Larkhill's history is well covered in N. D. G. James, *Gunners at Larkhill: A History of the Royal School of Artillery* (Henley-on-Thames: Gresham Books, 1983), but I am pleased also to thank Lieutenant Colonel (ret.) "John" Payne, lately of what is now the Royal School of Artillery, Larkhill. [Back](#).

Note 87: Army Council Instruction 20 (12 February 1915); King's Regulations ¶767. [Back](#).

Note 88: James, *Larkhill*, 47, 51. [Back](#).

Note 89: E. G. Angus papers, IWM; James, *Larkhill*, 47-8. [Back](#).

Note 90: Ellershaw was with I Corps from February 1917-February 1918, VIII Corps from February-June 1918, and VI Corps from then to the Armistice. Larkhill had an attached RFC flight for the rest of the war, perhaps due to Ellershaw's connections. [Back](#).

Note 91: The men are W. B. Browell and W. G. Thompson. There is considerable confusion in the early command structure, and establishing a full chronology of commanders is difficult; the name of the school is also rendered with almost every possible variation, often by the same source. [Back](#).

Note 92: Much of this section is drawn from SS157 (May 1917), "Report on the Overseas Artillery School, Salisbury Plain, November 1916-March 1917," available as [Appendix 21](#).

[Back.](#)

Note 93: Haig Diary, 11 Jun 1917. [Back.](#)

Note 94: Sandys Diary, RAI, 21 January 1917, 18-23 February 1917. Sandys himself went to Larkhill upon being promoted to BGRA in February 1917. [Back.](#)

Note 95: Headlam papers, conferences, 28 December 1916 and files 67-76, 177; Bland papers, RAI, letter, C. W. Scott to Bland, 3 April 1917. [Back.](#)

Note 96: Headlam papers, file 70, "Calibration: Statistics prepared by R. A. XV Corps to determine Muzzle Velocity from wear measurements," and file 177 with letters and reports on gun performance, shells, training, and tactics; R. H. Chapman, *A Treatise by Major RH Chapman on the calibration of guns and howitzers by the direct measurement of muzzle velocity, as carried out at Shoots of Artillery in France and England (Chapperton Down) 1917 and 1918*; RAI Military Document 2021. There were also wire-cutting tests in December 1917, February and March 1918; Headlam papers, files 100 and 104. [Back.](#)

Note 97: Headlam papers, files 100, 104. [Back.](#)

Note 98: Headlam papers, RAI, file 67. [Back.](#)

Note 99: Another indication of Kirwan's dynamism is that he apparently provoked the school at Shoeburyness to produce its own pamphlet "Notes on Trench Warfare for Field Artillery compiled at the School of Instruction RH & RFA." After Kirwan's return to France, Shoeburyness returned to its slumbers. [Back.](#)

Note 100: Metcalfe had been CRA of the 18th (Eastern) Division until July 1917, BGRA of XVII Corps until September 1917, was then relieved to organize Larkhill's season, returning as BGRA XI Corps in April 1918; this pattern was similar to Kirwan's. [Back.](#)

Note 101: 5 were prospective brigade commanders, 1815 battery commanders: SS157. *Rawlins, History*, 249. [Back.](#)

Note 102: *Rawlins, History*, 251-2. [Back.](#)

Note 103: *Ibid.*, 254-5. [Back.](#)

Note 104: Geographical Section, *General Staff Report on Survey on the Western Front, 1914-1918* (London: HMSO, 1920), 108; J. R. Innes, *Flash Spotters and Sound Rangers* (London: Allen & Unwin, 1935), 150; Sir Lawrence Bragg, A. H. Dowson, and H. H. Hemming, *Artillery Survey in the First World War* (London: Field Survey Association, 1971), 38. Bragg et al seem unaware of work done at Larkhill, work that, however, was fruitless. [Back.](#)

Note 105: SS552, "Sound Ranging," March 1917; Geographical Section, Survey Report, 177.

[Back.](#)

Note 106: Anstey galley proofs, 194. [Back.](#)

Note 107: von Donop Papers, IWM. Unfortunately he gives no dates for this, but it was clearly in the early days of Amatol, probably between April and June 1915. [Back.](#)

Note 108: Ibid. The tests were probably done in August and September 1915. [Back.](#)

Note 109: In 1914, Henry Horne was already calling for "wireless aeroplanes." Horne Papers, IWM, "Notes on artillery during the attacks of 13th and 14th [September, 1914] and subsequent operations on the Aisne," 2. [Back.](#)

Note 110: Tests were conducted on the 3 November 1914, with one aeroplane working with each battery. "Further Notes on Artillery in the Present War, November 1914," Helps Papers, IWM. It may have been this system of which GHQ had 10,000 copies printed; it was already described as the "old" system. WO158/681. [Back.](#)

Note 111: Reminiscence of General H. de Pree, quoted in John Terraine, *Douglas Haig: The Educated Soldier* (London: Hutchinson, 1963), 42-3. [Back.](#)

Note 112: Col. C. E. Callwell, *Small Wars: Their Principles and Practice* (London: HMSO, 1896). [Back.](#)

Note 113: CDS2-4 and 53; CDS2 was GHQ reprinting III Corps' "Tactical Notes" of September-October 1914. [Back.](#)

Note 114: E.g. with gas: SS134 (December 1916, March 1918), "Instructions for the use of Lethal and Lachrymatory Shell." There were revisions immediately after the Germans introduced mustard gas: see penciled draft at the IWM. In 1917 SS139/4 "Artillery in Offensive Operations" included details on gas far more advanced than 1916's CDS98/4. [Back.](#)

Note 115: CDS24, "Object and Conditions of Combined Offensive Action (translated from the French)" (June 1915), while the next month GHQ published CDS50, "Tactical Notes" (31 July 1915), explaining how the British army should fight. These are available as [Appendix 8](#) and [Appendix 9](#). [Back.](#)

9. Command and Staff Arrangements

1

Introduction

In modern war, the greatest commander still needs a staff. The staff take the commander's ideas and turn them into the orders that send troops where they are most needed. In peacetime, the command system reflects expectations of the next war, what each part of the army is supposed to do, but also how they are to work together. Thus its organization and priorities also reflect how an army thinks about its components. Wartime changes are nearly inevitable as these pre-war assumptions are proven false. These changes are reactive, fixing things that go wrong. In the First World War, armies faced unprecedented tactical, strategic, and logistical problems. New technologies had to be harnessed to solve current problems rather than create new ones, a process that tended to expand staffs as officers who understood at least some of the new technologies were assigned to help those who did not. Commanders had to grapple with everything from laundries to poison gas, and new staff arrangements were inevitable.

The BEF's artillery command and staff systems were just a part of this expansion, paralleling the general trend. While substantial and widespread, the number and scale of the changes did not imply a different relationship between the artillery and the other arms. The eventual structure reflected the artillery's place in the army and the changes in its importance. Artillery officers actively sought changes in their command structure, but only so they could do their job better, not to take over the combat role within the army. The first years of the war saw the worst structural problems, but the new command structure was complete by the winter of 1916-17. This allowed the artillerymen—and the rest of the army—to become familiar with it, and after that point time could be spent on tactical and technical innovations. Changes took place at all levels, and we will follow them from the bottom upwards.

The Battery

The smallest artillery unit was the battery, consisting of six guns and roughly two hundred men. (Horsed batteries had around 150 horses as well.) Heavier guns were grouped in smaller batteries, as few as two for super-heavy rail guns, but manpower varied little. Batteries had no staff of their own, and field batteries only a maximum of five officers: a major as Battery Commander; a captain in charge of administration and transport; and three lieutenants each commanding two guns (a section), including their personnel and horses.

During the war, batteries suffered far fewer changes than corresponding infantry units, with most changes being restricted to the number of vehicles, horses, and drivers in each battery. As new types of guns were manufactured, new types of siege battery were created from scratch, and establishments were juggled for both new and existing units. Most of the changes were marginal, adding or subtracting a few Army Service Corps or Army Ordnance Department men as some function was centralized or decentralized. In comparison, infantry battalions had men transferred or earmarked for virtually every specialty under the sun (snipers, scouts, and signalers were only a few), and by the end of the war their total strength had been cut nearly ten percent. Even the

internal structure of the battalion saw serious upheaval, with platoons becoming a more important tactical formation than companies; conversely, the artillery sections never threatened the battery.

The Brigade

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Artillery brigade headquarters also saw little change to their own structure, but like the infantry brigades their components changed markedly. Similarly, they became much less independent as the scale of the war overwhelmed them. The brigade staff was reasonably adequate to handle the stresses of wartime, mainly because the pre-war view of the artillery brigade as the main combat unit meant that its staff was reasonably large at the beginning. We have indirect evidence that the staff was adequate because, despite growing administrative and technical requirements, there was still only minimal expansion at this level. The only change was an increase of one officer, and only because the Royal Engineers transferred responsibility for communications to the artillery.¹ Over the course of the war, artillery command and control were centralized well above brigade level, but brigades still had plenty to do, mainly administration and the never-ending struggle to maintain communications with subordinates.

The components of a brigade changed during the war, in both the RFA and RGA. In 1914, all RFA brigades had three batteries, all either 18-pounders or 4.5-inch howitzers. While this generally remained true in Regular Army divisions, it broke down in the BEF as a whole. The Indian Army divisions, New Army divisions, and Territorial Forces all had different artillery strengths and organizations. Administration and supply became even more of a problem, and it was difficult to plan operations when units were not interchangeable. A series of battery and brigade reorganization efforts through 1915 and 1916 all failed, but finally over the winter of 1916-17 a workable plan was implemented. Field artillery brigades were reorganized to comprise three six-gun batteries of 18-pounders and a fourth battery of 4.5-inch howitzers. (Even this is a slightly idealized picture, and almost one-quarter of brigades either lacked the howitzer battery or had four 18-pounder batteries.) The difficulty of commanding two different kinds of artillery was balanced by the reduction in numbers of brigades, which allowed more experienced commanders to apply their expertise. The new brigade neatly matched the tactics of the creeping barrage, for one 18-pounder battery would be superimposed over the other two (waiting for targets of opportunity) while the 4.5-inch howitzers spread their fire ahead of the rest. This pattern proved successful and survived the war.

There were two kinds of Royal Garrison Artillery brigade in 1914, but both were merely paper organizations. Siege Brigades were to be formed from the heaviest available howitzers. Two Medium Siege Brigades, each of two 6-inch howitzer batteries, were planned, plus a Heavy Siege Brigade of 9.45-inch howitzers. However, the units were instead mobilized as batteries that were then sent to France individually and employed individually. It has not been possible to trace what happened to the jilted peacetime brigade commander, Lt. Col. C. O. Smeaton, but he held no senior posts during the war and was even allowed to retire in 1917. The other theoretical brigade organizations of heavy guns were the Heavy Brigades. These were merely peacetime administrative groups before the Heavy Batteries were parceled out to divisions upon mobilization.

The Siege Brigades failed largely because they did not fit the command structure. RGA Brigades had never taken part in maneuvers, and few officers knew their potential; they also fell into a gap in the command structure, since the only artillery officers legally entitled to command them were divisional Commanders, Royal Artillery. Corps-level artillery officers were officially Advisers who lacked command authority. A division rarely warranted a whole brigade of siege artillery, but the corps artilleryman could not take command on behalf of the corps; splitting the brigades and attaching batteries to divisions solved the problem. With every division clamoring for artillery support, it is not surprising that the available guns were thinly spread.

Heavy artillery grouping passed through several phases during the war. After the 1914 campaign ended, brigades were created for the heavy artillery. In essence, each corps received a brigade headquarters to oversee whatever heavy artillery was assigned to the corps. Thus the brigades had no fixed form, and any number of batteries (with different gun types) were lumped together. Nor, with only one brigade per corps, were they functionally differentiated. A brigade was responsible for controlling all heavy artillery activity and administration in a corps sector. This worked badly and was quickly modified, with most howitzers being parceled out to divisions while a new command echelon was created on top of what were now called "Brigades RGA." Beyond these tactical problems, the hodgepodge brigades led to complaints about discipline, training, and administration. While doubtless true, one can sympathize with a brigade commander operating without a trained staff, trying to cope while everything around him changed, including his subordinates.

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This new headquarters was the Heavy Artillery Reserve Group (HARG), which controlled heavy guns and the heaviest howitzers. ² In a BEF still concerned with procedural nicety, the HARG lacked command authority and had to issue orders through the brigades, which did become functionally differentiated, into units of bombardment howitzers or counter-battery guns. It was a stop-gap system, and the chain-of-command was hazy—for instance, to whom was the HARG commander responsible? In an undeveloped artillery chain-of-command (the corps Artillery Adviser lacked command authority), it was typically an already-busy corps or division commander, who often failed to make the best use of the artillery.

The next experiment, introduced early in 1916, was Groups, commanded (as brigades were) by lieutenant colonels. These were nothing more than brigades under a new name, but they were at least functionally organized and had some dedicated staff. There were still the problems of administration and discipline as batteries moved around through different groups, but matters did improve. The improvements did not, however, stem from the creation of the Groups. Rather, officers were more experienced at solving the problems inherent in the system, which helped, and a new system at corps level helped too. There was a slight refinement in 1917, when two groups became a "double group," with one of the commanders handling operations and the other administration. This was restricted to the most active sectors of the front because elsewhere guns were not so concentrated.

Over the winter of 1917-18, there was a final reorganization of the RGA back into brigades. After the war, Birch wrote that the reorganization was done "as soon as it became feasible." The delay was caused by the pressures of the Passchendaele campaign, which demanded terrific exertion by

the artillery and also absorbed such a high percentage of artillery units that there was little opportunity to rest units by rotating them to quiet sectors or to institute a BEF-wide reorganization.³ This time the brigades had four firm formats: Mobile, 8-inch Howitzer, 9.2-inch Howitzer, and Mixed.⁴ Standardized units eased the work of the staff, who could tell a brigade's composition from its name. Brigade commanders' authority increased with the tightening of the chain of command, and both administrative and disciplinary matters improved because batteries no longer floated among brigades or groups. The RGA ended the war with this structure and kept it afterwards.

Overall, the brigade changed in ways that went unremarked. The RFA brigade hardly changed in structure, but it declined mightily in importance. Brigades simply did not operate in the way that had been envisioned before the war. They had to fit into a larger framework, and just how that would happen would be settled at higher levels. Meanwhile, the RGA had the same problems of establishing a command chain, but these were greatly exacerbated by having to create brigade-level structures as well.

The Division

Before the war, the division was expected to play a small role in artillery planning, with most command and control decentralized to the brigades. This changed, suddenly and almost completely, early in the war, and the division staff could not handle the work. Instead, corps headquarters took over many functions, which relieved the pressure on divisional artillery headquarters.

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At the division level, most changes happened early in the war. At first the divisional Commander, Royal Artillery (CRA) was the only artillery officer legally able to command anything, so all artillery was parceled out to divisions. By early 1915 this had changed, but CRAs still commanded a plethora of batteries. Some were brigaded, but some were not, and the un-brigaded ones had to be commanded directly from the artillery headquarters, which had no extra resources. There were also tactical and supply problems, caused by mixing different types of guns and ammunition. It does not seem that any CRA complained when, slightly later in 1915, the heavy guns were taken away.⁵ Further reorganizations had little impact on the division level, except that in early 1917 one-third of the divisional artillery was taken away. This too provoked no complaints, and CRAs got on with their job.

If no longer commanding heavy artillery, CRAs still controlled it during bombardments. In preparing bombardments, target categories and priorities would be dictated at a high level—often army, and there was frequently input from GHQ. Divisions in the line, however, would name which targets in their sector were to be bombarded and how heavily. This would be settled by the unit commander, the CRA, and the infantry brigade commanders, so the CRA was very much a team player, and the infantry had a great deal of input into the detailed planning. The CRA also controlled all wire-cutting in the divisional sector, whether by trench mortar, field artillery, or medium howitzer. This was another powerful reason for a division to spend several days in the line before an attack, for it took a few days to learn the details of a sector and handle any last-minute bombardments.

Corps would monitor divisional plans, arrange for enfilade fire across division boundaries, conduct the counter-battery campaign, and co-ordinate field artillery barrages. Corps also had command of the parts of the Royal Flying Corps dedicated to assisting the artillery, and integrated both aircraft and balloons into artillery plans. All this meant that bombardment orders came from corps headquarters, a fact that camouflages the input from divisions and the infantry. Despite nominally commanding only a few brigades of field artillery, a good CRA could significantly affect an entire corps' bombardment plan. Furthermore, during an offensive a division would be supported by as much as three divisions' worth of artillery, all of which would be under the direct command of the CRA of the division in the line. In 1916, this sometimes caused problems, since the frontline CRA was expected to command each brigade direct (and there might be ten brigades), which placed a huge strain on a very limited staff. This was due to the problem of rank. The CRA of the frontline division might be junior to the CRA of a supporting division's artillery, in which case he could not give orders, but he would certainly be senior to the brigade commanders.

By 1917 it was common for sub-groups to be formed, of only two or three brigades of artillery, and a CRA would give his orders through the sub-group commanders, typically the CRAs themselves. This did not answer the problem of rank, but apparently nobody caused trouble. The system caused some friction and led to a few calls for change, but GHQ was satisfied and focused their efforts on solving the problems of the RGA. ⁶ All this goes far toward explaining how in 1918 a CRA could handle both a reinforced divisional artillery and frequently a heavy artillery brigade: they had already done so, even if under corps supervision.

Thus the divisional artillery headquarters had more authority by the end of the war, but a manageable level of work, unlike early-war improvisations. One part of making the workload manageable lay in sensibly reorganizing brigades, but a very large part was experience. It was the experience that allowed a return to decentralization in the mobile battles of 1918, but also a smooth return to centralized control under corps artillery headquarters.

The Corps

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As modern warfare demanded more and more firepower, armies added more artillery. We have seen that the BEF did not, in the long run, assign that artillery to divisions. Instead it was controlled at the corps level, which was not the main bone of contention. The problem was simple: who would give the orders? If the artillery officers did, it might increase the artillery's effectiveness but would certainly undermine the time-honored chain of command running from the corps commander personally. Gradually the old-fashioned way was proven to be a failure, and at the same time the artillery officers proved to be team players, defusing the problem.

At the beginning of the war the corps was seen as a "mailbox" headquarters, passing orders from GHQ on to the divisions with only minor elaborations. In keeping with this view, a corps headquarters controlled no combat troops of its own, and any extra units allotted to the corps were assigned to the component divisions. As far as the artillery was concerned, there was an Artillery Adviser (AA) at corps headquarters, but he lacked both authority to issue orders (unless troops

were specifically assigned to him) and the staff to implement any orders he might issue. In 1915, the HARGs were the first artillery units outside the divisions to be granted command authority, but the breaking of precedent had little effect upon AAs. ⁷ They were still advisers, consulted (or not) as the corps commander saw fit. Several tried to gain and assert authority, but that was a haphazard affair, depending on whether the corps commander permitted it. Some AAs signed themselves as Brigadier-General, RA (their rank), others GOC, RA (a function), and some by their title of Artillery Adviser. Oddly, in some cases the same man would be both BGRA and GOCRA, having been allotted command of some artillery but only advising about the rest.

In February 1915 GHQ reorganized artillery into three categories. ⁸ "Divisional Artillery" was now field guns and howitzers and the few mountain guns, which were thought adequate to "support the infantry both in attack and defence." Medium artillery was called "Army Artillery" and was attached by armies to the divisions; it might migrate with a division or remain covering the same sector when the infantry moved. The few heavy artillery pieces (over 6-inch caliber) became "GHQ Artillery," and were allotted to armies "to influence the course of operations after the battle has become fixed." This was the artillery that became the Heavy Artillery Reserve Groups. In all this reorganization, corps artillerymen played no role whatsoever, largely because the necessity for an intermediate command echelon had yet to be proven. Armies had existed a scant two months, and there had been no fighting during that brief period.

In July 1915, after the spring battles were over, the Artillery Adviser at GHQ (Major-General John du Cane) pointed out to the Chief of the General Staff (Sir William Robertson) the difficulty divisional CRAs were having. He requested that "superior artillery Commanders should be specially appointed ... 'the very best men being selected and adequate staffs being provided.'" ⁹ Du Cane had in mind the gradual assumption of responsibility by AAs, starting with the power to co-ordinate but later placing all heavy artillery under the Artillery Adviser's command. Robertson had no fixed views of his own, and put the question to the three armies with the dismissive caveat that even if they thought corps artillerymen should be commanders, that authority would seldom be necessary. While corps were starting to play a greater role in administration and tactics, especially for the infantry, for the artillery they were still clearly superfluous. The three armies were barely lukewarm in support, and all thought the circumstances requiring a command echelon between division and army would be rare, although a special artillery commander had been appointed (or at least requested) for some of the BEF's attacks.

To be fair, in 1915 the shortage of shells and guns meant there was little need for an intermediate commander. The BEF never had enough guns to support an attack larger than two divisions, and a good CRA could handle that much artillery. It was certainly difficult for a CRA to handle two divisions of field artillery plus attached heavy artillery, and it took time to prepare, but it was not impossible. While the system made no provision for any future developments whatsoever, it was a fair reflection of the situation in mid-1915. Du Cane accepted the armies' views, having won support for granting Artillery Advisers a tiny staff and some command authority, if only in limited circumstances. Du Cane was not seeking independence for the artillery, and spelled it out for Robertson: "If a Commander wishes for assistance or advice in connection with his artillery, he should receive it from his staff—as regards the employment of the arm and its organisation, from the General Staff..." ¹⁰

The battle of Loos fell into the cracks of this system. Rawlinson lacked confidence in his Artillery Adviser, but on the same day that he asked for A. H. Hussey's replacement there was a major command reshuffle. GHQ created a formal corps artillery headquarters and gave the AAs command authority over a large portion of the heavy artillery. ¹¹ Rawlinson was in a bind, because he did not feel he could ask for Hussey's replacement, but he liked the new system. At least he liked it in theory, but he wanted the incumbent batch of former AAs replaced with good men: "There are plenty of them if only [GHQ] will promote the junior ones." ¹² Rawlinson had to work around Hussey by never admitting the need for a corps Artillery Commander, instead forming clumsy groups and sub-groups under the command of one of the CRAs. (Hussey never realized that the maneuvers were being taken to avoid him, being either monumentally dim or successfully kept out of the loop. After Loos he remarked that corps artillerymen were receiving authority "just too late for me." ¹³) Plans then had to be co-ordinated by Rawlinson himself, in consultation with each division commander and CRA, while to get heavy artillery support the HARG had to spread itself between all the divisions "without reference to Corps" to avoid Hussey. ¹⁴ The convoluted artillery chain of command did not cause any catastrophes at Loos, where the main artillery problems were shortages of guns and shells. Still, it hardly helped. After the battle, IV Corps looked for lessons, especially regarding the artillery. C. E. D. Budworth (promoted to become IV Corps' GOCRA after, as the CRA of the 1st Division, having done the work for Hussey) wrote in coded language:

The Artillery plan of action should be a Corps Artillery plan ... It is distinctly preferable that the Artillery plan for the action of both heavy and light artillery should be drawn up by one officer. Rightly or wrongly, Divisional Commanders look to the Corps Artillery Commander ... and they did not understand why there should be divided control. ¹⁵

Sir John French's GHQ promptly decided the corps artilleryman did indeed need to have command authority, and re-titled the AA "General Officer Commanding Royal Artillery of the Corps" (GOCRA). But GHQ immediately contradicted itself. Nominally the *Commander* of the artillery, he still had only coordinating responsibilities unless otherwise notified. This lasted only a few brief months before Haig's GHQ further muddled the waters by creating the post of Commander, Corps Heavy Artillery (CHA). At the same time the GOCRA, Corps was retitled the Brigadier-General, RA (BGRA), and receded to being solely a coordinator. The CHA definitely had command authority, but the BGRA mostly did not. This led to great muddle, confusion, and variation between different corps. In at least one corps the CHA refused to take orders from the BGRA, his superior on the organization chart but lacking command authority, unless they were channeled through the General Staff. It was at just this time that GHQ's Director of Operations, John Davidson, wrote to Haig that the Fourth Army's corps would need experienced gunner officers—perhaps to cut through the nonsense that GHQ had created or encouraged. ¹⁶ Rawlinson rose above the problem by giving orders within the Fourth Army to ignore GHQ's change to the GOCRA, and for the duration of the Somme fighting his corps would have corps artillery *commanders*. ¹⁷ The artillerymen tried to get the confusion sorted out and at GHQ Birch took on the Chief of Staff (Launcelot Kiggell) over the matter, but only won the argument in December 1916. Birch's evidence was straightforward: many corps and armies already granted their senior artilleryman command authority because "the experience of warfare proved that to be necessary." ¹⁸ Birch was exasperated and wanted the "bogey of dual control [between corps or army

commander and their artillery subordinate] buried," pointing out that there was no trouble on this score with the Royal Flying Corps, an organization in a roughly analogous position to the Royal Artillery. In December 1916, as noted above, GHQ returned the title GOCRA to corps-level artillerymen, and also bestowed it upon MGRAs at army level to forestall subordinates having more command authority than their superiors. From this point onwards, relations improved. Uniacke would complain at the end of 1917 that corps commanders should not be allowed to downgrade the GOCRA to an adviser, but there is little evidence this took place during battles. ¹⁹ Most officers worked at winning the war.

Over the course of the war the nature of the corps changed considerably. ²⁰ It began as theoretically only a way-station for orders, and for the artillery that situation lasted too long. In early 1915, steps were taken to anticipate some of the problems of handling large bodies of artillery, primarily via forming the HARGs. The anticipation was highly creditable, but the new methods proved inadequate. Unfortunately no action was taken during the quiet summer of 1915, and the battle of Loos was fought under a command system that was known by at least one key participant to be flawed. This undoubtedly contributed, if only slightly, to the shambles that occurred. Afterwards the problem was rapidly addressed, but artillery was the last element of corps responsibilities that was solved. The corps had already become an important administrative headquarters, and also organized all aspects of infantry operations. Without much thought, the pre-war concept of the corps as a group of divisions that moved and fought together was changed. Now divisions would come and go and a corps generally stayed put, covering a sector of the front. This let the small artillery staff in corps headquarters develop expertise about operational differences in a particular sector. (The corps-level artillery staff grew from one but stayed below six, largely because the heavy artillery staff and counter-battery staff were technically independent.) It is, unfortunately, impossible to discern what weight was given to this consideration in the decision that corps should become part of the terrain.

1916 saw corps developing far more control over their divisions, but some of that control passed up to the army level. One reason corps artillery became more important was the increasing depth and sophistication of the creeping barrage: once heavy artillery was involved, corps not only had to participate, but also had to organize the barrage. ²¹ After two months' experience during the Somme offensive, GHQ drafted (but apparently did not send) a memo warning divisions and corps to stop changing artillery orders and also granting the higher echelons more control over operations. ²² (The memo is available as [Appendix 42](#).) This trend of greater centralization continued throughout the trench-warfare stage of WWI. On quiet fronts, the army would lay down policy and corps handled operations, while during attacks the armies took a more active role in organizing and coordinating artillery operations. Friction seems to have been remarkably slight, suggesting that most senior artillerymen accepted the situation. Afterwards there were complaints that centralization increased "until individuality was well nigh starved out of existence," but this was not only an exaggeration, but a willful neglect of the fact that an organization the size of the BEF needed a degree of standardization and centralization. ²³ By 1918 it was possible for a corps' artillery to shift effortlessly between three types of control: one for ordinary trench warfare; a second, more centralized, to handle a bombardment or barrage; and the third, more decentralized, for mobile fighting. ²⁴

Throughout these changes, the artillery proved that a stronger chain of command within the artillery let a formation commander better use his artillery. While on paper this model potentially cut across other chains of command, in fact it helped solve problems. Because the Royal Artillery was not looking to fight a private war but was seeking the best way to be a productive team player, the potential problem never arose.

Corps Heavy Artillery

The heavy artillery of the corps was in a different, and far less confrontational, command situation. Very early in 1915 some heavy artillery had been taken away from divisions and entrusted to Heavy Artillery Reserve Groups. At first there was one per army, but this link fell away into a broadly (but not wholly) functional role of handling counter-battery work. The troubles that ensued, especially at Loos, foreshadowed the demise of the HARGs. But someone had to take over the heavy guns, and since corps had recently been given control over the field artillery of their component divisions it was natural enough that corps should have control over their allotted heavy artillery. Army bureaucracy moved slowly, and the changes approved in January did not take effect until March. ²⁵

Right from the start, the Commander Heavy Artillery (CHA) was officially a commander, as HARG commanders had previously been. (In fact, many of the CHAs were promoted HARG commanders.) Clearly, the troubles this would cause for his colleague, the BGRA/GOCRA, were not foreseen. To make these new CHAs, the HARGs were abolished and, since there were not enough to go around, some corps had to create CHA headquarters. This was less trouble than it sounds, for most corps had unofficial heavy artillery HQs before they were authorized because it was simply common sense to have someone controlling the heavy guns. ²⁶ The men who were HARG commanders or CHAs were (with the sole exception of Herbert Uniacke) RGA officers, who better understood the heavy weapons and their use. It is notable that, while essentially only RGA men commanded heavy artillery, as the war dragged on RGA men rose beyond commanding just heavy artillery and became corps GOCRA, and one even became an army MGRA. By 1918, seven of eighteen corps on the Western Front had had a siege artilleryman commanding all their artillery. In a nutshell, the technicians proved better able to learn tactics than the 'horsey' tacticians proved able to master the intricacies of ballistics. But the point should not be taken too far—there were many very competent RHA and RFA officers.

There was little change in heavy artillery headquarters, simply the trickling addition of staff officers as the need became acute. In some ways the Counter Battery Staff Officer (CBSO) was a part of heavy artillery headquarters, but this was always a matter of personal relationships since the CBSO was technically only "attached for counter battery work." There was one proposal made mid-way through the Somme offensive that CHAs should become attached to the landscape, not changing sectors when the rest of a corps headquarters did but instead becoming experts on a certain area. This was quashed when Birch pointed out the necessity of confidence between corps commanders and their two artillerymen. This would seem to fit Tim Travers' model of a "personalized" rather than "efficient" system of command, but as best as can be judged only one CHA was replaced when a new corps commander took over, so the system must have been reasonably efficient. ²⁷

Army Level Artillerymen

Before the war, the British army did not have armies; they were a wartime phenomenon, and so were their artillery staffs. The original BEF split into the First and Second Armies on 26 December 1914, and most of the staff appointments at GHQ were replicated in the new armies. Artillery, however, was not among these. Early rumors had it that since one army had an artillery officer as its Chief of Staff, he could advise his army commander on artillery matters too. ²⁸ Just how this would help the other army was unclear, but was clearly unimportant. This state of affairs did not last long, and it was only a month after the armies were formed that a Major-General, Royal Artillery (MGRA) was appointed to each. At first their duties were light, for despite being promoted to major general, they were simply a more senior edition of the Artillery Adviser at the corps level. ²⁹ In April 1915 their duties were finally defined, but it was primarily a case of putting the status quo on paper:

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As the duties of Artillery Advisers are not laid down in the Staff Manual or in Field Service Regulations ... they should be defined in order that possible misunderstandings should be avoided. Except as provided for below the duties of an Artillery Adviser are purely advisory. He is not a Commander nor is he a Staff Officer. ³⁰

The exception mentioned was the practice of detailing the MGRA to specific short-term tasks, hardly efficient use of a major-general. Because an MGRA was not a commander, there was no repeat of the arguments that raged around the GOCRA at corps level. Of course, had artillery command been centralized at the army level, the argument that did erupt at corps level would have instead taken place about the role of the MGRA. Apart from a minor change of title (to GOCRA in December 1916, mirroring the change at corps level), there was no real alteration in the post of MGRA at an army. ³¹

So the situation remained through 1915 and 1916. Charles Budworth was the MGRA for the Fourth Army, yet he does not stand out during the Somme planning. From the records, it is clear that Rawlinson consulted Budworth, but over the same period he apparently spent more time talking with corps commanders and Archibald Montgomery, his chief of staff, about artillery matters. ³²

During a battle the MGRA was substantially like a conductor of an orchestra, playing no instrument himself but controlling the others. He held conferences to share and disseminate information that, due to other organizational quirks, only the army had. The most important variety was information from air reconnaissance, since long-range reconnaissance was done by the army-controlled RFC Brigades. Air reconnaissance closer to the front was done by Corps Wings, and conferences allowed that information to be shared laterally. ³³

MGRAs had relatively little to do. They directly commanded the railway artillery, coordinated all artillery plans between corps, changed corps artillery boundaries, and generally handled administration, including allotting shell supplies. Early in the war they handled most counter-battery work, but that was soon delegated to corps. A more important function was distributing

artillery amongst subordinates, which required understanding the tactical problems facing each and balancing all against the supply of guns. Beginning with the winter of 1916-17, MGRAs laid down artillery policy for quiet times, trying to maximize the results from counter-battery work, minor bombardments, and harassing fire between offensives. Some also realized that better staff work—especially at the army level—would permit more use of surprise through better control of fire. ³⁴ Because army MGRAs had limited responsibilities, they only had a limited staff, so the full details of their activities are murky.

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Very rarely was an MGRA used in the original sense of commanding a particular concentration of artillery. H. F. Mercer took command of a large part of the artillery of the First Army to support the Canadian Corps attack at Vimy, but that is the only significant example. ³⁵ It did not happen in 1915, when the problems in the chain of command at corps level might have made it reasonable. Instead, at that time infantrymen such as Rawlinson preferred to keep the artillery in their own hands. About Neuve Chapelle, Rawlinson noted that "the allotment of tasks and objectives of the [artillery is] being conducted + arranged under my own immediate direction & orders." ³⁶ An MGRA's role in planning attacks lay more in elaborating than inventing—taking part in discussions about the attack, then (when the infantry were reasonably satisfied) organizing the guns as best they could around the fixed features of the operational plan.

Overall, the role of the senior artilleryman, and the artillery staff, at army level was relatively uncontroversial. The main reason was that there was relatively little at stake—the MGRA was mainly an administrator and coordinator and commanded very few guns. If the BEF had assigned the bulk of the artillery to the armies, the MGRA would have had the problems that confronted the BGRA/GOCRA at corps level.

Gunners at GHQ

There was little argument over the responsibilities of the Artillery Adviser at GHQ, largely because it was clear that it would not be a command position: GHQ simply did not command any units in combat. But was still a critical position, because the AA (later MGRA) was the most important artilleryman in the BEF, working for changes in the artillery command system at all levels. The artillery staff at GHQ also changed, expanding in ways that demonstrated the increased responsibilities and bureaucratic obstacles that had to be overcome to make the most effective use of the artillery.

GHQ started the war with an Artillery Adviser in much the same position as any other senior artillery officer—an adviser who could be entrusted with some task or other. The first, Walter Lindsay, made no particular mark upon history. He was not called upon to command any body of artillery except for the abortive attacks in December 1914 and even then the force commander, Horace Smith-Dorrien, sidelined Lindsay. ³⁷ Lindsay's main occupation was worrying about ammunition supplies, where his preference was apparently for shrapnel over HE. ³⁸ In early January 1915 he was sent home to use the experience he had accumulated as Inspector of Royal Horse and Field Artillery, the sting of his removal eased with a knighthood. He eventually commanded the 50th (Northumbrian) Division for a short spell before being shuffled off to be commander of a remote area. ³⁹

His replacement was John du Cane, who spent most of 1915 acting as the intermediary between the Ministry of Munitions and the troops in the field. ⁴⁰ He was hampered in this by bureaucrats operating through "the normal channels" who objected, in essence, to ruining the peacetime system by using it to fight a war. ⁴¹ Eventually he won the point, with the support of the Ministry of Munitions, who preferred to talk about artillery with an artilleryman rather than negotiating with Ordnance Services. Du Cane had the job at a thankless time, but took sound steps to improve munitions, manpower, and the command structure. He took the first steps towards confronting the issue of corps-level artillery control despite opposition or indifference from many below.

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Around the time Haig replaced French, du Cane was attached to the Ministry of Munitions to bring them some field experience, and was replaced at GHQ by John Headlam. ⁴² Headlam had actually risen through the artillery hierarchy in the BEF, first as a CRA and then as MGRA of the Second Army for nine months. ⁴³ He and the Second Army had opposed many of du Cane's proposals about the chain of command, but he bore no grudges and actually expanded the corps artillery hierarchy to include the Commander, Heavy Artillery. In fact, during the course of 1915 there was something of a sea change in Headlam's views, for in November he shook up the Second Army's arrangements to create responsible artillery commanders at all levels:

[I]t is essential to ensure a chain of artillery command that corresponds to the ordinary chain of command of formations- divisional, corps and army. When therefore a corps is employed as a whole in any operation the general officer commanding the artillery of the corps will, under the orders of the corps commander, make out the artillery plan, and will co-ordinate the action of the whole of the artillery. In the ordinary work of holding the line the general officer commanding the artillery of a corps will be chiefly concerned with the co-ordination of the work of the divisional and corps artillery, the latter of which is directly under his orders. ⁴⁴

That autumn the Second Army devised a number of reorganization plans; it is remarkable that an army was able, on its own initiative, to adopt such a different system. Presumably this was because GHQ was now leaning in the same direction, but the effect of waking GHQ up and getting them to ponder the matter ultimately only worked to delay matters. The Second Army had to postpone its plans until GHQ made up its mind. ⁴⁵

Headlam arrived at GHQ in December 1915 only a few days before Haig, and held the post just a few months before Haig replaced him with the man he wanted for the job, Noel Birch. After the war, Headlam claimed he was replaced because he had got on the wrong side of Haig at a GHQ dinner in 1915, but his account does not answer all questions that remain. ⁴⁶ Despite being the odd-man-out in Haig's headquarters, he worked hard, starting some of the projects that would bear fruit for Birch. As Haig shook up the whole BEF, making it face up to the prospect of a long war under trench-warfare conditions, Headlam started the process with the Royal Artillery. The key event was the issue of the "Artillery Notes" series of pamphlets, described in more detail in the previous chapter. The first item on the agenda at Headlam's first conference after Haig's arrival was creating "a common doctrine." ⁴⁷ (The minutes are available as [Appendix 11.](#)) While Headlam had a reasonable record on training and doctrine at the Second Army, the responsibility for having pushed a common doctrine via "Artillery Notes" seems to lie with Haig.

Despite a solid performance, Headlam was eased out of GHQ in favor of Birch, clearly a protégé of Haig's. ⁴⁸ Haig had slipped Birch into the first available CRA post, then up to corps (both in 1915), army, and finally GHQ (both in the first half of 1916). ⁴⁹ Despite Headlam's work, Birch was dismissive of the situation of MGRA at GHQ:

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When I first joined at GHQ I was told that I was an Artillery Adviser and I was ushered into a room containing two staff officers. There was not even a list of the guns in France in the office. ... There was no department to collect all the technical experience of other nations. Nobody watched the tactical development of the artillery and issued instructions for the guidance of people fighting in the line. ... The first thing that had to be done at G.H.Q. was to form a department to get an artillery "doctrine" going and to submit a programme of artillery material, including ammunition, to get the artillery staffs in different formations organised, etc., etc. As you know, we now have an office—no doubt an imperfect one—consisting of 10 officers. ... The office is divided into a tactical side, a technical side and an artillery intelligence side. ⁵⁰

Birch was able to make changes because he had the confidence of the commander in chief, who was willing to make the changes needed to get the whole BEF squared up to fighting a long, hard war. The first job was to continue work on that "common doctrine," and the production of pamphlets did not diminish. Birch was also dragged into discussions with the War Office about the number of guns required to win the war. This was more than an artillery question, for it depended on the type of war that was expected and the available manpower. It involved industrial effort and manpower allocation on the national level, but there is no evidence GHQ spent much time looking at these factors, which should have been a War Office responsibility anyway. Simultaneously, Birch was overseeing the planning of the Somme campaign and trying to predict how many guns would be needed to 'solve' trench warfare.

During 1916 Birch fought, and lost, a battle about the rights of artillerymen in the chain of command. He only sought enough authority for artillerymen (mainly MGRAs) to enable them to give orders to subordinate artillerymen, strengthening the control of a formation's commander by strengthening his artilleryman. ⁵¹ (Two key letters he wrote that he thought should be preserved are available as [Appendix 17](#).) However, this would have been a hybrid between the staff officers (who had no combat troops) and the subordinate commanders (who were not staff officers). Practically, the question boiled down to an MGRA signing his own letters. On paper it would have been a small step, but raising the question of divided command was a giant leap, and Haig did not back Birch against the inertia of the system. ⁵² Birch was not a radical, but he failed to persuade the critics that his proposals were within the spirit of the existing system. Thus, he would always be subordinate to the traditional staff departments even as he built an efficient artillery staff and solved many of the BEF's artillery problems—and even won the title of Major-General, Royal Artillery instead of Artillery Adviser. But he did not think that subordination to the General Staff was wrong, and he did not try to recast the artillery into the leading arm within the British army. After the war, he wrote, "what good would the artillery have been on the 8th of August [1918, at the Battle of Amiens], without stout infantry to hold the ground which tanks, aeroplanes, cavalry and guns had assisted them to win?" ⁵³ Instead, Birch specifically restricted himself to urging the General Staff "that higher formation commanders must really study artillery tactics of the present

war." ⁵⁴ If the commanders did so, Birch felt, they would become better commanders, but even if they did not, it was the duty of their artillerymen to be loyal subordinates.

By the end of 1917, the duties of the MGRA at GHQ had been codified. He acted "as Adviser to the three principal Staff Officers [Quartermaster General, Adjutant General, Chief of the General Staff] on all artillery matters," while being allowed to write directly on technical matters (only) to all and sundry. ⁵⁵ In 1918 Birch won minor bureaucratic turf battles with the Tank Corps and the Director of Gas Services, but the question of the artillery's subordination in the system was never again raised. ⁵⁶

Birch himself saw his job as divided in three parts: tactical, technical, and intelligence. To handle these was well beyond the ability of any one man, and Birch built around himself an able staff, one that he worked as hard as himself. ⁵⁷ Building a staff at GHQ had been a slow process for the Royal Artillery, reflecting the Artillery Adviser's difficulties in his no-man's-land between staff and command. At one point the Army Council intervened by suggesting that a Royal Garrison Artillery officer be attached to GHQ, although whether as a subordinate to or a rival of the AA was unclear and possibly undecided. Sir John French defused the proposal with a little praise of the incumbent Artillery Adviser, and very little else happened to the AA's staff during French's tenure. ⁵⁸ Tracing the personnel of the GHQ artillery staff is difficult, and their functions are even harder to discern, as the lists only show names and ranks. ⁵⁹ By June 1918, which must represent very nearly the final design, there was an MGRA, a BGRA, an Assistant Director of Artillery, two General Staff Officers, Grade 1 (GSO1s), and a junior for each. ⁶⁰ The BGRA was almost certainly a deputy, while the Assistant Director seems to have worked with technical matters and especially heavy artillery. One of the GSO1s was responsible for liaison with the Allies; this position may have been upgraded from earlier in the war once the Americans arrived, needing all the help they could get. Three years earlier there had been only four men in the office: the MGRA, a lieutenant colonel, and assistants for each. The grading of artillery staff officers caused almost as much trouble as the position of their seniors. Sticklers for protocol insisted for several years that Royal Artillery staff officers could not be graded as General Staff (GS) officers, as they did not handle GS material and must be Deputy Assistant Adjutant Generals, even though they just as clearly did not do Adjutant General's work. Eventually, in late August 1917, they were allowed to be General Staff officers. ⁶¹

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Tactical information was gathered through visits to formations, special questionnaires, and after-action reports. The last were only sporadically used, although they were more common earlier in the war, and seem most common from Dominion formations, both corps and division. ⁶² While the Canadian Corps definitely saw itself as a unit apart, it may be tentatively suggested that ANZAC units felt a greater need to spread ideas, as their cadre of regular officers was smaller than in British units. ⁶³ Sometimes these reports were produced after operations that the formation felt were discrete: Vimy Ridge, the advance to the Hindenburg Line, Messines, or just completing their spell in the line during an attack. Cambrai was something of a special case, since there was a formal Court of Inquiry, but the Court did not focus on the artillery. More frequent was consideration of artillery in a broader after-action report, or one linking the artillery with, for instance, the RFC. Special questionnaires were used mainly in 1918 to inquire into the events of the retreat. Visits by senior officers generally took place before or during operations; visits were

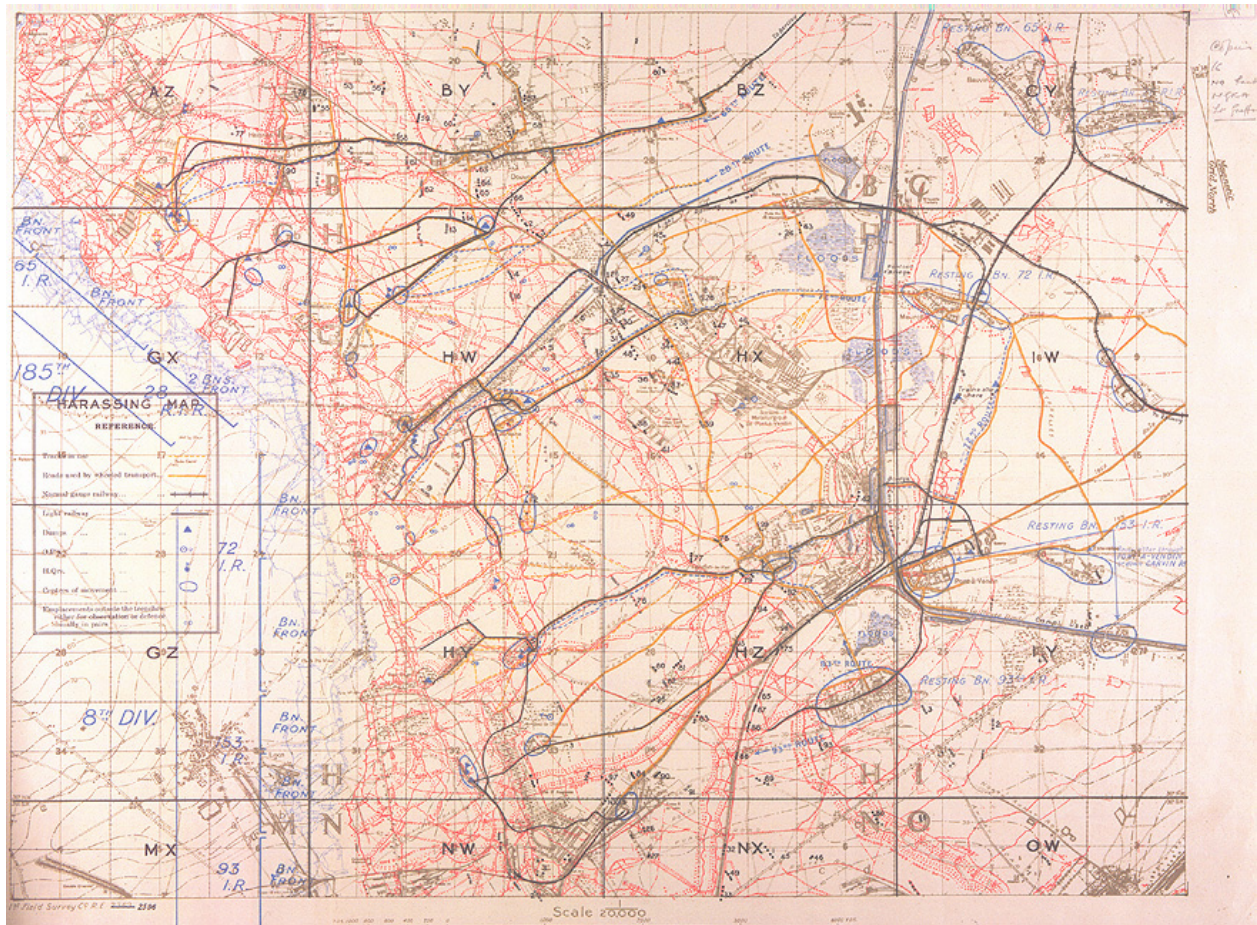
most likely to the scene of the action, not to formations in quiet sectors. During quiet periods, most notably winters, commanders visited units more evenly. Still, a considerable amount could be learned while operations continued, at least by those at a sufficient remove from the day-to-day concerns. There were also occasional trips by supernumerary officers to recent battlefields, as well as liaison visits to the French. Of course, conferences during operations were a way for senior officers to acquire information and spread ideas.

For GHQ to apply tactical information was relatively rare, since it was so many levels removed from the battlefield. The most common recorded advice seems to have been about which lines were most defensible from an artillery point of view. Thus Birch examined winter defensive lines as early as 15 August 1916, and the next winter he contributed some notes about holding salients that were clearly the lessons he drew from the German counterattack at Cambrai. ⁶⁴ However, this is likely a selection error in the surviving material: defensive schemes were written down, but offensive tactical advice would have been transmitted verbally at a conference. One area where GHQ's artilleryman did affect battlefield results was in the distribution of artillery. From the middle of 1916, Birch's office kept tables reflecting how many guns each army held, and not just raw numbers but their density as well. ⁶⁵ From 1917 on, there were definite rules of thumb as to how many guns would be needed for an attack and for defense. From their charts GHQ could tell at a glance how many brigades of field artillery could be removed from each army down to the minimum of 1 gun per 200 yards, what the effect of removing each brigade would be, and the effects of adding brigades. Birch would then advise the General Staff on which sectors needed artillery and which sectors could spare it—or he could answer General Staff demands for action.

Technical information naturally came up through the chain of command, since complaints (far more common than praise) about equipment could only be solved by those above the users. By 1916 munitions production had reached a reasonable rate and attention turned to quality, and in this regard GHQ served as the natural medium for communication with both the War Office and the Ministry of Munitions. Suggestions and requests from the front and London would be funneled through GHQ, subject, of course, to being quashed at any level. GHQ never conducted its own technical investigations (roughly the function of an Operational Research section in World War II), but by the winter of 1916-17 practical test results were arriving from the field. ⁶⁶ The main topic was how effective various shells were for various battlefield purposes, a crucial piece of information but one for which virtually no hard data existed up to that point. The reports dealt with the spread of shrapnel at various ranges, the fragmentation pattern of HE shells (both of which strongly affected the creeping barrage), lethal radii of shells, wire-cutting results, and performance against defenses, especially pillboxes. ⁶⁷ Meanwhile, pleas and suggestions to improve guns went to the Ministry of Munitions and manufacturers, who responded to GHQ's requests for improvements. ⁶⁸ Through all this, the job of the MGRA's staff was to stay abreast of technical developments so that tactics could be adjusted as necessary. Considering the constant tactical and technical improvements of the British artillery during the war, the job was well done.

Intelligence was the third function of Birch's GHQ staff, although it seems to have employed the fewest officers. At the GHQ level, artillery intelligence was nothing more than the collation and examination of reports from below, looking for patterns that had been missed lower down; GHQ had no additional sources of artillery intelligence. Birch's intelligence staff watched how far

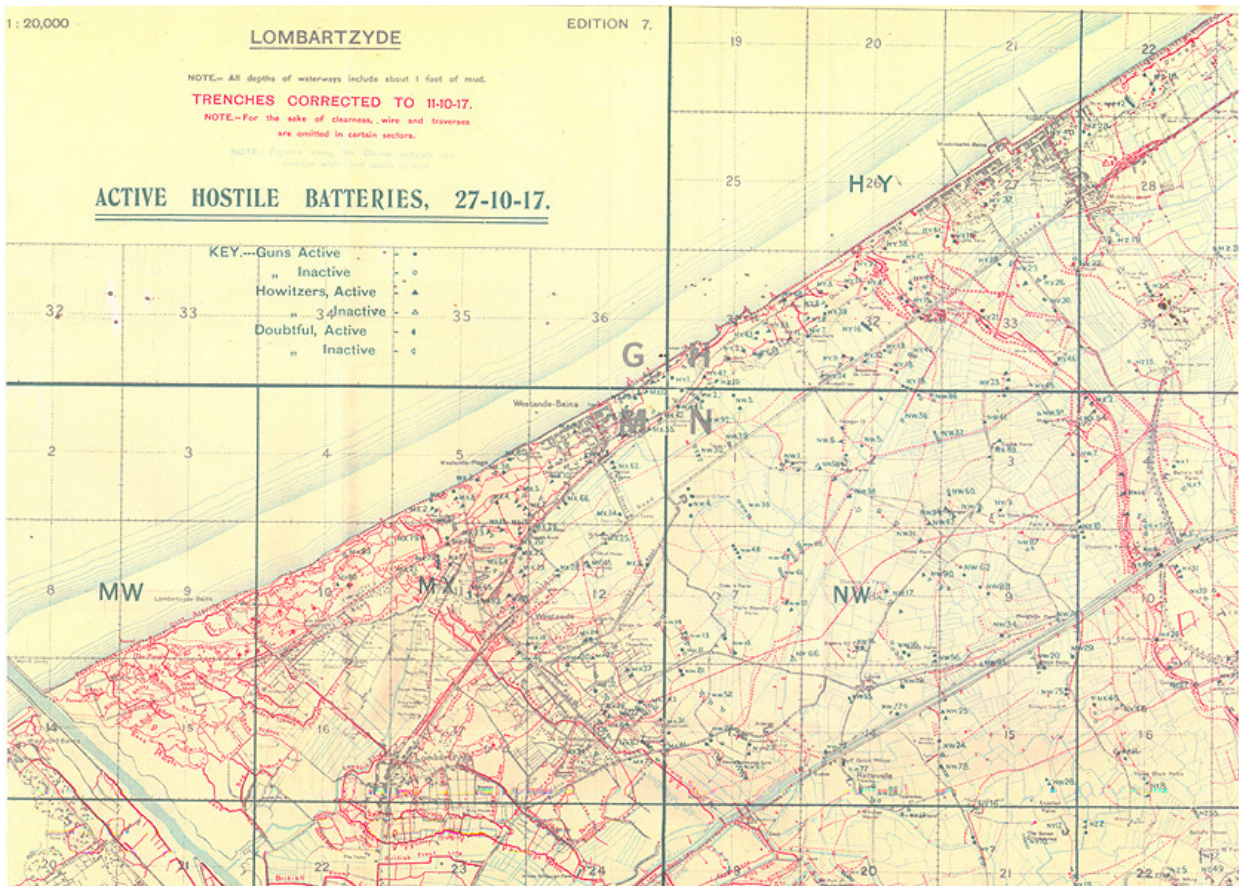
forward or back German guns were deployed, which provided clues about German intentions and tactics. Artillery intelligence was only a part, albeit a very important part, of the entire intelligence picture. Through 1917 GHQ monitored how many guns the Germans deployed against British attacks, not only to help develop attack tactics but also to ensure proper distribution of counter-battery pieces. (Map 6 shows some of the information that intelligence collected on a German trench sector, and is a counter-battery intelligence map.)



Map 6. Harassing fire map, Loos sector, August 1917. An immense amount of intelligence could be accumulated in a quiet sector. This map contains not only a great deal of counter-battery information but also details about the routine German trench garrisons and their standard travel routes. With this information in hand, the BEF could fire to inflict casualties, fire to block some or all routes of travel, or to lull the Germans into patterns that could be exploited later. **Source: WO153/957.**

When expecting a German attack in 1918, GHQ put even more effort into artillery intelligence, largely because it misunderstood German plans. The British expected German offensive methods to parallel British ones, especially concerning a prolonged preliminary bombardment. This made tracking German artillery very important at the strategic/operational level, but assumed there would still be some tactical warning. This turned out to be very wrong—the Germans did not (and did not intend to) copy British bombardment practices. Of course, things went wrong for the Fifth

Army beginning on 21 March 1918, but an example of proper intelligence work and anticipation was provided only one week later when the Third Army crushed the 'Mars' offensive on the first day.



Coastal sector Active Hostile Batteries map, 27 October 1917. In the coastal sector, the Germans had the upper hand in terms of artillery. For an offensive to succeed, the British needed to destroy or neutralize the majority of artillery batteries shown on this map, and to do so quickly. The broader situation never warranted the attempt, and the BEF consciously chose not to try nibbling what it could not swallow in one bite. **Source: Author's collection.**

Later in 1918, artillery intelligence grew in importance as it became clear that surprise was critical for the prospects of a German offensive, and every GHQ intelligence summary included a section on German artillery activity. ⁶⁹ There was not enough German heavy artillery to mount two simultaneous attacks, and German intentions could be discerned by following the reinforcing artillery as it moved from place to place. Later in the year, once the Germans lost the initiative, artillery intelligence played its role first in attrition of the German forces, then in selection of places for British offensives. For instance, the Fourth Army paid great attention to the number and types of German guns facing them at Amiens, checking for any hint that the Germans expected an attack. ⁷⁰

Such was the use of artillery intelligence at GHQ, but artillery intelligence work extended down throughout the BEF. ⁷¹ At the beginning of the war, there was virtually no structure to handle artillery intelligence, which simply did not exist as a separate category. There was no need for it: since artillery was expected to deploy in direct fire positions, artillerymen could gather intelligence by simply picking up their binoculars. When artillerymen began using indirect fire to save their lives, artillery intelligence had to be produced. At first it was the preserve of the HARGs, since they had complete responsibility for counter-battery work. ⁷² Lacking anyone officially tasked to collect and collate information, the task was handed to the group commander's

With more sources of intelligence—flash spotting, sound ranging, ground observers, RFC, and Kite Balloons—the task grew too large, and in 1916 intelligence officers were appointed to Corps Heavy Artillery HQs. ⁷³ Headlam wrote, "What is wanted is an intelligence officer, not necessarily an artillery officer," and so he got men from all over the place. These included at least one cavalry officer and a subaltern from the Royal West Kents. ⁷⁴ Perhaps Headlam did not realize what he was signing away: as soon as these officers appeared, the chief of intelligence at GHQ (John Charteris) grabbed them for *his* empire. He defined their duties and made sure their reports went to the intelligence office first and the artillery later. It sounds like a small matter, but it meant some delay in getting the information to where it was most useful, since it was produced for the intelligence office first and then distributed to others.

The arrangement broke down in well under six months, with Rawlinson complaining that the non-gunners were technically illiterate, pointing out that "it is the artillery point of view which is paramount." ⁷⁵ Charteris put up a furious rear-guard action, fearing the loss of any part of his fiefdom and arguing that the intelligence officers had helped him greatly (whether they helped the artillery mattered less to him). Eventually Birch won the argument, and GHQ's recommendation to the War Office was that every level of the artillery staff should have an intelligence officer. This was accepted in essence, but to avoid Charteris' grasp they had to be called "Reconnaissance Officers." In January 1918, when Charteris was removed, Birch seized the opportunity. He ordered the armies to report their intelligence to him—MGRA rather than intelligence—and used his possession of the field to negotiate a better agreement with Lawrence, the new head of intelligence. Perhaps Herbert Lawrence (who was promoted to chief of staff) realized what had happened, for Birch was never able to win the next stage of his campaign, to get artillery intelligence officers upgraded to GSO3s or even GSO2s.

Thus, at the end of the war GHQ had a strong artillery staff with firm leadership, but no control over units. Birch and his officers worked through the General Staff but worked effectively and, in general, without complaint, because they were not seeking independence but rather the best way to help the combat arms.

Conclusion

So from bottom to top the artillery (as so much else of the BEF) had different command and staff structures at the Armistice than it had in August 1914. These changes were almost always reactive, introduced because something was not working. The one proactive exception was creating fully staffed Heavy Artillery Reserve Groups, but unfortunately the question of field artillery command

was not addressed until later, until the system had clearly broken down. The key time for changes was the winter of 1915-16, and the credit must be shared between John Headlam, Noel Birch, and Douglas Haig. They built the new system that gave artillery officers enough authority to make tactical improvements and adopt new technology. Bureaucratic infighting dogged every change (those that happened and also those that were only proposed) in the artillery chain of command, and it must be said that this was a complete waste of effort. None of the artillerymen involved was trying to build an empire, to separate the artillery from the rest of the army, or even to significantly alter the role of artillery vis-à-vis other arms. Birch once protested to Horne "... I do wish other arms were not so afraid of our poor down-trodden Regiment. They are as keen if not keener than anybody else to win the war and are most anxious to do it," which may have been a bit overstated, but epitomized Birch's attitude. Since he was the senior artilleryman, his views influenced the whole BEF. ⁷⁶

Yet even those as conservative as Birch sought evolutionary improvements, adapting to the war's novel problems. The greatest change was the same as for many other units: the appearance of a slightly separate chain of command, parallel to the ordinary General Staff chain, but subordinate to it, pulling in the same direction for the same goals. Most of the organizations in charge of the new weapons (e.g. gas, aeroplanes, and tanks) obtained the same thing; senior airmen and tankmen were in touch with their juniors without going through the General Staff. However, there was more concern about the artillery. Perhaps this was an unconscious compliment to the gunners, implying that they mattered more than a few men with gas cylinders. More likely it was the difficulties always encountered in changing a bureaucracy, a process harder than creating one from scratch. The constant goal of the senior artillerymen was to use artillery efficiently to help the rest of the BEF. Their reorganizations were always directed to that end, and once their system was reshaped the artillery worked as well as possible, subject always to someone else's final decision.

Notes:

Note 1: Weber, "Mobile Artillery," 55, available as [Appendix 37](#). [Back](#).

Note 2: Seven of the ten HARG commanders later rose to higher levels of command; the other three continued at the same level after a re-organization in March 1916. Talented men had been identified for these commands early in the war, but conditions were not ripe for them to have much effect yet. [Back](#).

Note 3: *Rawlins, History*, 156-9. Sir Noel Birch, "Artillery Development in the Great War," *Army Quarterly* 1:1 (1920): 79-89 (available as APPENDIX 39). [Back](#).

Note 4: This is a slight exaggeration: ten other Brigades remained, an average of two per Army. These handled railway guns and other oddments, and thus eased rather than hindered standardization. See Farndale, *Western Front*, 357. [Back](#).

Note 5: As with almost everything in a BEF that peaked at over fifty divisions, this must be lightly qualified, for it was common for a division in a quiet sector to have some 60-pounders and/or 6-

inch howitzers available, but to give up a battery of 4.5-inch howitzers. The division gained guns for harassing fire or minor destructive work, while corps used the field howitzers for gas shelling. [Back](#).

Note 6: Uniacke wanted to pull *all* artillery from the divisions, giving it to corps, which could have reduced the infantry's voice in planning by leaving out infantry brigades. Birch took no action; the BEF had enough re-organizations that winter, the artillery's share being RGA brigades. Uniacke Papers, RAI, U/I "Lessons from the 1917 Battle Fighting ... from an Artillery Point of View." [Back](#).

Note 7: Sometimes the AA was put in charge of the HARG (only), creating a redundant layer of command. Hussey Diary, 20 May 1915, RAI. [Back](#).

Note 8: OA2/11D, 26 February 1915, WO158/275. The Second Army took their time in implementing the order, almost six months. V Corps CHA diary (WO95/757), 3 August 1915. [Back](#).

Note 9: *Rawlins, History*, 5; this section draws heavily upon Rawlins, 5-10. [Back](#).

Note 10: Undated memo (but mid August 1915), extracted in *ibid.*, 7. [Back](#).

Note 11: Gough, at this time commander of I Corps, blamed GHQ for taking three weeks to actually issue this letter. Rawlinson Diary, CCC, 1 September 1915. [Back](#).

Note 12: Rawlinson Diary, CCC, 3 August 1915. [Back](#).

Note 13: Hussey Diary, 28 October 1915, RAI. Hussey was downgraded to CRA of the 5th Division, his post until the armistice. [Back](#).

Note 14: "Instructions Issued to IVth Corps Artillery by Brig-Gen CED Budworth," 21 September 1915, Montgomery Massingberd Papers, LHC, file 6/4. [Back](#).

Note 15: C. E. D. Budworth, "Remarks Based on Recent IVth Corps Artillery Operations," 6 October 1915, Montgomery Massingberd Papers, LHC, file 6/4. Budworth's Somme experiences reinforced his views on centralized control: "Some Artillery Lessons of the battle of the Somme," Montgomery Massingberd Papers, LHC, file 48. [Back](#).

Note 16: Memorandum, 4 March 1916, WO158/19. [Back](#).

Note 17: Conference notes, 6 April 1916, Fourth Army Operations Papers v. 6, IWM. It is not clear what steps Gough took, but Uniacke, his MGRA, is unlikely to have looked kindly on CHAs or BGRAs who kicked up a fuss about their official position. [Back](#).

Note 18: *Rawlins, History*, 10. Letter, Holland to Birch (Rawlins Papers, RAI), 24 August 1916.

The Canadians claim to have always used a GOCRA, avoiding these troubles. Nicholson, *Gunners of Canada*, 242-3. [Back](#).

Note 19: Uniacke, "Lessons of 1917," 34-5. [Back](#).

Note 20: Mr. A. Simpson is researching the broader question; I try to restrict my remarks to the artillery. [Back](#).

Note 21: C. N. F. Broad, "The Development of Artillery Tactics, 1914-1918," JRA 49:2 (1922): 77. [Back](#).

Note 22: Rawlins Papers, RAI, 1162/12a c. 23 August 1916. At about this time the Fourth Army began setting an army-wide pace for the creeping barrage. [Back](#).

Note 23: Weber, "Mobile Artillery," 55. [Back](#).

Note 24: Nicholson, *Gunners of Canada*, 242-3. The Canadian Corps had some organizational advantages over British corps, some of which operated under much the same system while not claiming superiority. [Back](#).

Note 25: Headlam Papers, RAI, 21 January 1916. [Back](#).

Note 26: E.g. VI Corps CHA (WO95/784), c. 4 April 1916; X Corps BGRA and CHA, (WO95/862 and /866), 5 November 1915, 2 March 1916. [Back](#).

Note 27: H. O. Vincent of X Corps was replaced two weeks after a new Corps commander, who arrived in July 1918. However, Vincent had held the post for 31 months and may have been worn out. [Back](#).

Note 28: Haig Diary, WO256/3. The absence of an MGRA bothered nobody; the First Army's did not arrive until six weeks after the Army's formation. WO95/154, 16 February 1915. [Back](#).

Note 29: *Rawlins, History*, 1. [Back](#).

Note 30: Idem. [Back](#).

Note 31: Nor was there much addition to their staffs until September 1918, which led to poaching officers from batteries as needed, to the detriment of staff work and the batteries concerned. *Rawlins, History*, 16-17. [Back](#).

Note 32: Montgomery was an artillery officer, and may have given Rawlinson artillery advice. If so, there is no record of conflict between Budworth and Montgomery. Budworth was a horse

artillery officer and spent most of the war as MGRA of the Fourth Army. Before the war he had written enthusiastically of artillery becoming a combat arm by shared effusion of blood in the front lines. He was a skilled officer who learned from operations, weeded his subordinates, and did not rage against the status quo, but when in 1918 the whole BEF changed, he was ready. Like Uniacke at the Fifth Army, while Budworth did not try to make fundamental changes in the relationship between artillery and infantry, under his leadership the Fourth Army were significant innovators in artillery methods. [Back](#).

Note 33: See R. MacLeod's letter to Edmonds, 5 May 1937, CAB45/136. [Back](#).

Note 34: Broad, "Artillery Tactics," 80. Broad was a staff officer to Herbert Uniacke, and the Fifth Army was one of the first to have a winter artillery program. [Back](#).

Note 35: WO95/168, 26 March 1917. [Back](#).

Note 36: Rawlinson Papers, NAM, file 7, "Note on the Attack of Neuve Chapelle, 18-2-15". [Back](#).

Note 37: French Diary, IWM, 10 December 1914; III Corps Diary (WO95/668), 11 December 1914. [Back](#).

Note 38: Lindsay to von Donop (MGO), 10 November 1914, WO159/15 (von Donop correspondence with various officers in the BEF, November-December 1914). [Back](#).

Note 39: The Royal Artillery Regimental List has him only as a "Commander," meaning of something like the Harwich Defenses. He retired in late 1917, being kept on only a few months beyond statutory age. [Back](#).

Note 40: Du Cane had staff experience from South Africa and various pre-war staff posts but was not Staff College trained. [Back](#).

Note 41: E.g., Director of Ordnance Stores, 30 July 1915, 5 October 1915 and 1 June 1917. WO95/58. [Back](#).

Note 42: Du Cane went on to command XV Corps and in April 1918 became liaison officer with GQG. His stint as corps commander was relatively undistinguished. [Back](#).

Note 43: Barring an appointment from outside the BEF, Headlam was the best option. The First Army's MGRA had declined command of a division, and the Third Army's had only two months experience. [Back](#).

Note 44: Second Army RA letter 763, "Organisation of Heavy Artillery", 30 November 1915: V Corps CHA diary (WO95/757). Second Army had been discussing the re-organization of heavy artillery since the beginning of the month: Corps Commanders' Conference, 1 November 1915,

Headlam Papers, RAI, 183/8. [Back.](#)

Note 45: Second Army Conferences, 22 November 1915, Headlam Papers, RAI. [Back.](#)

Note 46: Headlam to Secretary of Royal Artillery Institution, 15 July 1940, in A. F. Becke Papers, RAI military document 1115. [Back.](#)

Note 47: Conference of Major-Generals RA, 24 December 1915, Headlam Papers, RAI, 183/8. [Back.](#)

Note 48: Headlam spent some time in untraced posts, then served in the War Office, including trips to Russia and America (on his passport giving his profession as Major-General), and eventually with the Ministry of Munitions. Inexplicably, his papers at the RAI include many of GHQ's artillery files for 1918. [Back.](#)

Note 49: Birch's career closely parallels another of Haig's protégés, Hubert Gough. Birch was an artillery brigade commander in the Cavalry Division, then Gough's CRA, Gough's BGRA, and advanced to GHQ at about the same time Gough was given command of Reserve Corps. Birch is less well known presumably because he did not fail, but it is worth giving Haig the credit for picking talented subordinates when he did so. [Back.](#)

Note 50: Birch to Maxse, 3 November 1918, Maxse Papers, IWM, file 66/1. [Back.](#)

Note 51: Uniacke Papers, RAI, U/III/13, memos to Kiggell of 8 June 1916 and 29 July 1916, attached as Appendix 17. Birch was not a trained staff officer, and may not have realized all the implications. He was not, however, a disorganized man, and selected a good staff and then worked them hard. [Back.](#)

Note 52: Part of the troubles about recasting the role of the MGRA may have been concern over weakening corps vis-à-vis army once corps had been decided upon as the main echelon of operational command. [Back.](#)

Note 53: Birch, "Artillery Development." [Back.](#)

Note 54: Anstey Galley Proofs, 193; letter Birch to Furse (Director of Artillery, War Office), no specific date given but between January and August 1917. [Back.](#)

Note 55: *Rawlins, History*, 3-4, and Appendix A. [Back.](#)

Note 56: After the war, the Report of the Committee on Staff Organisation noted, "the senior artillery and engineer officers with formations are rightly appointed as Commanders and advisers with power of inspection. They cannot be Staff Officers, and their orders to lower formations must go through the Staff. On purely technical questions they should be entitled to correspond with their opposite numbers in the lower formations...." Boraston Papers, IWM. Essentially the British

Army operates under the same system today: M. J. Tomlinson, "Handling Artillery Within the Corps," *British Army Review* 75 (1983): 5-15. [Back](#).

Note 57: I am grateful for the comments of the late Mr. P. G. W. Annis, author of the *Dictionary of National Biography* entry on Birch. Birch viewed a staff as decentralizing, not like the previous personality-run system. Birch, "Artillery Developments." [Back](#).

Note 58: WO32/5152, draft letters from WO to French March 1915; French to WO 27/3/15. The British army had the polite, if frustrating for historians, habit of solving problems with unofficial, private, or 'demi official' correspondence, leaving little controversy evident in the official files. [Back](#).

Note 59: *Composition of Headquarters British Forces in the Field* (titles varied slightly), various editions. [Back](#).

Note 60: Interestingly, almost all anti-aircraft work (supervised by a Brigadier-General, General Staff with a GSO2 and GSO3) was part of the Staff Duties section at GHQ, not on the MGRA's staff. *Rawlins, History*, 14-16, covers some of the changes to GHQ's artillery staff, including its reduction by one in early 1915, as the Director of Ordnance Services fought bureaucratic battles, if not the Germans. [Back](#).

Note 61: *Rawlins, History*, 13-14. [Back](#).

Note 62: IV Corps wrote a report after Loos, the Fourth and Reserve Armies after the Somme: Montgomery-Massingberd Papers, LHC, files 6/4 and 7/4; WO158/344. Vimy and Messines were both followed by reports, being very much set-piece battles. On the Canadians, see Bill Rawling, *Surviving Trench Warfare: Technology and the Canadian Corps, 1914-1918* (Toronto: University of Toronto Press, 1992), especially 85, 132-3 and WO95/1059-60. [Back](#).

Note 63: According to information kindly supplied by Dr. John Bourne, Australian CRAs had such martial pre-war careers as carpenter, pharmacist, and architect. They were reservists, doubtless keen ones, but they did not have the military experience that full-time professional soldiers did. [Back](#).

Note 64: Rawlins Papers, RAI, 1162/12a; 1162/12b, 10 February 1918. [Back](#).

Note 65: Rawlins Papers, RAI, file 13, "Calculations on and Records of Allotment of Artillery." [Back](#).

Note 66: A tiny amount of testing had been done early in 1916, clearly preliminary to the Somme offensive, about how prolonged firing affected guns. Unfortunately, I have found no copies of this research (the predecessor to SS114, "Notes on the Care of Guns During Prolonged Bombardment," March 1917). [Back](#).

Note 67: Pillbox tests gave information that worked both ways. Based on the tests, British pillboxes were designed to protect the occupants against shells up to six inches in diameter. The tests had shown that men who survived larger-caliber hits were too addled to be effective, so—to be brutal—there was little point in protecting against heavy shells. Peter Oldham, *Pill Boxes on the Western Front* (London: Leo Cooper, 1995), 113. [Back](#).

Note 68: See I. V. Hogg and L. F. Thurston, *British Artillery Weapons & Ammunition 1914-1918* (London: Ian Allen, 1972), for the progressive improvements in ordnance. [Back](#).

Note 69: See the summaries in the G. P. Dawnay Papers, IWM. [Back](#).

Note 70: Fourth Army War Diary, WO95/436. [Back](#).

Note 71: This section draws heavily upon *Rawlins, History*, 20-27. [Back](#).

Note 72: Intelligence and counter-battery work went hand-in-hand, except at the rarefied level of GHQ. See APPENDIX 40. [Back](#).

Note 73: However—the British army being as practical as it is—at least some corps already had an unofficial detachment of an intelligence officer to handle the artillery. III Corps BGRA diary (WO95/689), 14 November 1915. [Back](#).

Note 74: VIII Corps (WO95/825); IX Corps (WO95/841). [Back](#).

Note 75: *Rawlins, History*, 22. [Back](#).

Note 76: Birch to Horne, 19 October 17, Anstey Papers, RAI. [Back](#).

10. Conclusion: The Artilleryman's Place

1

Success can consist of meeting targets, even if meeting them falls short of absolute success. Few would say the First World War was an absolute success, and most of the blame has been pinned on the "donkeys"—the generals. The time absorbed by arraigning culprits has largely precluded consideration of the lesser definitions of success. Artillery is often brought in to debates over how the war should have been fought, debates that implicitly assume it was fought the wrong way and that the ultimate victory of 1918-19 was tainted. Yet imposing this view on the evidence will automatically distort the results, for it takes little account of the views of the participants, the people who actually made the decisions. How well did the artillery meet the goals set for it at the time, bearing in mind that those goals changed over time?

At the time, the British army divided itself into three categories: first, the combat arms; second, those who supported the combat arms in battle (combat support); and (a distant) third, various non-combatant (support) organizations. Infantry and cavalry were naturally combat arms, and it was equally clear that the Royal Army Veterinary Corps and Army Pay Department were support organizations. For the Royal Engineers and Royal Artillery the situation was murkier. Engineers used their specialized equipment and knowledge to help all parts of the army, but would fight when needed. Their attachment to combat units also emphasized that they were a combat support rather than a combat arm. The case of the artillery was rather different. Their specialist tools were weapons. Yet at the same time, artillerymen were seldom in the front line, and thus did not come to grips with the enemy. There was no question that gunners were fighting, but were they a combat arm? If they were a supporting arm, how should they best provide that support? Who should take the lead in planning, and who should make the final decisions?

The views of artillery officers on the artillery's role in the army are the critical starting point for judging what they should have done. Before and during World War I, artillerymen senior enough to affect policy almost unanimously believed that artillery should support the combat arms but that it was not itself one. This answer was reached not philosophically but practically: by itself, artillery fire neither gained nor held ground; its firepower might (as in the nineteenth century) occasionally win battles, but certainly not wars. The army-wide position was that the assault "*is made possible by superiority of fire*," but that firepower was not itself decisive. ¹ Artillerymen agreed. The assumption was so common, it was generally unspoken during the war, but it had been thoroughly discussed beforehand when adopting new equipment and developing doctrine to match it. The corollary was that artillery should do whatever it could to help the troops in contact with the enemy, doing what the combat troops wanted even if the artillerymen thought they had a better idea.

This was the combined product of pre-war theory and practice. Artillerymen had closely examined their performance in South Africa to learn lessons for a European war. The Boer War offered lessons, but it was not the only influence. The deliberations changed back when the new quick-firing guns created a reversal of the South African experience, where infantry

and cavalry had been separated from artillery on the battlefield. Separation had bad results in South Africa, and the artillery were right to try to improve, but were wrong to assume that gunshields a few millimeters thick obviated the need for better communications.

Communications were neglected in favor of voice command and proximity—batteries would surely, and brigades would probably, be under their commander's eye. Foreign experiences and ideas were not ignored. British observers watched the Russo-Japanese War closely, and French artillery doctrine heavily influenced the Royal Artillery. All this, but especially the new technology, combined to allow a return to the old style of operations, with guns dispersed and placed forward in close support of infantry and cavalry. In doing so another opportunity was lost, since nothing could be done if these predictions proved wrong. The system was overly decentralized, and also lacked the means to centralize. It would be years before the authority was granted to centralize, let alone means to implement it were developed.

5

The idea of subordination was not universal, and the exceptions ought to be re-examined. Before the war, the only challenge to this view came from from Manchurian experiences, but they only percolated slowly through the British forces. ² The great bulk of the army, and artillery, accepted *FAT's* flat statement:

Artillery cannot ensure decisive success in battle by its own destructive action. It is the advance of the infantry that alone is capable of producing this result. ... To help the infantry to maintain its mobility and offensive power by all the means at its disposal should be the underlying principle of all artillery tactics. ³

Disagreement first cropped up early in 1915. Facing the novel conditions of trench warfare (of unknown duration but expected to be short), the BEF had to decide how to react. One option was to radically overhaul the whole army and change the priorities among its elements, which might have given the artillery a higher priority, along with other technical elements. Another option was to continue more or less as things stood, but to say that at times artillery would be the key element, either during some period of all battles, or for the whole of certain battles. Many senior generals mulled this over, wondering if trench warfare was an entirely new kind of fighting that called for the abandonment of previous military thinking. If they thought of serious changes, typically they envisioned large amounts of artillery pummeling an area before the infantry advanced, obliterating defenders, trenches, and machine-guns alike, an approach that would later be termed 'artillery conquering, infantry occupying.' Yet these grand schemes all foundered on the shortages of guns and shells at a time when even small battles were fought hand-to-mouth. Once discarded, the possibility of fundamentally altering the army's way of fighting was not readily re-examined, especially as the war developed a momentum of its own.

Even though the general principle had been rejected, exceptions to the old methods might still happen. There were calls for particular battles to be fought more by the artillery and less by the infantry. Yet most of these calls came not from artillery officers, but formation—army or corps—commanders. It was Rawlinson who wanted to limit the first attack on the Somme, not Birch or Budworth. Horne set limits on the advance up Vimy Ridge, and Currie chose to fight behind a curtain of shellfire at Hill 70. Rawlinson, Haig, and the commander of XV Corps all agreed that artillery was dominant in the coastal sector during Third Ypres. Naturally these

generals had artillery advisors, but the final decision lay with them, not with the artillerymen.

In abstract terms, once artillerymen decided that their role was to support others, the next question was how best to do so. Artillerymen generally offered support however it was requested instead of conceding the principle but balking at the practice. Thus bombardments would be long or short as the overall formation commander wanted. He would set the priority for counter-battery fire, and he would set the pace for the creeping barrage. ⁴

10

Yet supporting as requested did not mean that the artillery—or the BEF in general—was stuck in the methods of 1914. New methods were developed, and they were spread around the army. This does not mean that everyone had to understand how the artillery performed its new tactics, but they did need to understand how those tactics could affect them. If infantry or tanks developments were not in step with the artillery, there might be a delay before something new from the artillery percolated through to combined operations. Thus predicted fire, a technique developed in mid-1917, was not widely used tactically until it was married with tanks in the Battle of Cambrai in late November. Furthermore, the preferences of the supported arm had to be humored, at least until new ideas had permeated sufficiently thoroughly to produce a new orthodoxy. As a result, there were frequent excessive bombardments in 1917, and the infantry were given the creeping barrages they craved throughout 1917 when, by later in the year, there were probably better ways to provide support, and certainly other things for the guns to be doing. Not until late in the year was there much change from uniform creeping barrages, and even that change was partly reversed in 1918, because heavy casualties had weakened the infantry, who then needed maximum support. It might also be that the requests for support changed rapidly, as with tanks needing increasing protection against anti-tank guns.

Under the circumstances artillerymen had a choice: to do what was requested, after explaining their situation and suggestions, or to attempt to over-ride the views of the men facing combat. They chose the former. Had they not, memoirs and histories would have a very different slant. Birch himself felt this point keenly, relieving his frustrations in a letter: "I have never ceased rubbing it into the General Staff that higher commanders of formations must really study artillery tactics of the present war type." ⁵ Since artillery tactics did change, this meant that senior commanders were continually studying, and changing.

But Birch's lament does reveal that many commanders were more than willing to issue orders *without* such study. Rawlinson, when planning the battle of Neuve Chapelle, first disagreed with the ideas produced by a conference of artillery officers, then cajoled Haig into agreeing with his own ideas. ⁶ Rawlinson can be excused for not studying artillery tactics in detail, as there was hardly any precedent to study. Fifteen months later, Rawlinson planned the Somme offensive with his Chief of Staff and MGRA. ⁷ It so happens that the pair were both artillery officers, but they settled the matter amongst themselves and then left the juniors—who had more front line experience—only to fill in the details. ⁸ The next year Haig, for all the attention he paid to Birch, might still not grasp the full situation. Examining the thorny situation of the coastal sector around Nieuport, Haig came to the right decision but for the wrong reasons. ⁹ These examples could be multiplied to little purpose; senior officers underplaying technology is one point upon which almost all histories justifiably agree.

At the same time, it was not a question of the artillerymen allowing the infantry (or any other single interest) to dictate operations. Artillerymen had views, and did not shy away from presenting them. Hugh Tudor admitted (and perhaps boasted about) his subterfuges as CRA of the 9th Division, and his preferences strongly affected that division's barrages. ¹⁰ Birch despaired of infantrymen who depended on a "creeper ... [to] take them to Berlin." ¹¹ Kirwan and Budworth played key roles in preventing heavy losses in the Nieuport area by obtaining an exemption from the BEF's ordinary vigorous counter-battery operations. ¹² Nor did the infantry have things all their own way in planning. Complaints were rife that attacks were launched—and lives hazarded—without adequate preparations, without support, without rest, or in inclement weather. Higher commanders had to weigh these risks against other factors: domestic political pressure, alliance political pressures, weather prospects, and their own theories of military operations. Just as infantry preferences usually outweighed those of the artillery, these issues generally overbore infantry considerations. All this took place under circumstances of more uncertainty than those under which most historical analysis is written, and it is understandable, while still lamentable, that judgments were not perfect.

The BEF's first serious trench-warfare attack came before a key debate was over. The question was whether the present war overturned all previous military lessons, or whether adaptations of classic principles would be enough. Planning for the Neuve Chapelle bombardment took place in this milieu, and was a lucky stab rather than good planning. Bombardments varied over the subsequent years, depending not so much on the artillery as on the infantry and what they needed done. Artillerymen did what they could to help the infantry, even if that usually came up short. There were times when it was known that artillery would be inadequate, perhaps most obviously at Loos, but even then there were powerful reasons to attack, especially alliance pressures. Regardless, the decision lay with GHQ rather than with any artilleryman. The earliest hopes for bombardments were that the guns need only sweep away obstacles between the British and German infantry. This was not enough—it almost never would be—and some destruction of defenses was necessary as well. The amount of destruction, and the relative importance of various target categories, would vary depending on the wishes of the British infantry (and of course on the German defenses, troops, and doctrine).

15

When British infantry were judged to be so poor that tactics boiled down to lines steadily advancing, more destruction was obviously needed. The gunners did the best they could. As the British infantry improved, the Royal Artillery could shift to other tasks. Technical skills in the artillery improved too, over time allowing more sophisticated employment, yet because it was a supporting arm adoption of new artillery tactics generally waited upon other arms. Infantry skills and weaponry continued to improve through 1917, allowing a shift in use of artillery from blowing a hole for the infantry to fighting a deeper battle, even evolving away from bombardments into other facets of artillery work, especially counter-battery fire and the creeping barrage. In 1918, after the severe infantry losses from the German spring offensives, artillery compensated by partially reverting to heavier bombardments. Experienced formation commanders knew the strengths and weaknesses of their units and used infantry, artillery, tanks, cavalry, and aircraft more effectively and efficiently than they had in 1916. Thus the use of artillery bombardments had changed, a change not pushed primarily from within the artillery but by changes in the whole BEF.

Counter-battery fire changed as well. Originally it had been thought of as an artillery duel, with batteries firing at each other as if they were chess pieces canceling each other. If gunners wanted to move away from the strictures of FSR, they could have turned counter-battery work into a private war. In the early stages of the war the Germans had more and heavier guns, and protecting British troops was the primary counter-battery task. It never declined. Instead, as German defensive tactics changed to using more artillery (and firepower in general) and less infantry (manpower), the BEF put more and more effort into counter-battery work. It was so important that Haig checked planning details, and perhaps the apogee was the suggestion to blow the mines under Messines Ridge just to provoke the German artillery. Much of the effort that in earlier years had gone into bombardments was switched to counter-battery fire, a mark that the bombardments had been successful, since the Germans had to change their defensive tactics. Technical and organizational changes came thick and fast, but throughout the upheavals, and despite the autonomy of Counter-Battery Staff Officers, the purpose and practice of counter-battery work remained firmly directed toward protecting others.

Barrages of fire were developed during the war to support the infantry, a new method that replaced the older form of direct-fire support during an attack. They developed because support was still necessary; the hope that the British infantry needed only a bombardment to open the way was punctured almost with the first machine-gun burst. Experience showed that British infantry lacked enough intrinsic firepower even after the German defenders had been bombarded for days, so artillery was called upon for another service. Once there were enough heavy guns for bombardments, almost all field artillery was used for barrages. Meant as infantry support, barrages naturally developed in tandem with infantry tactics. They grew heavier and heavier as long as the infantry did not trust their own skills and demanded as much assistance as possible; German tactical changes also kept the infantry demanding everything possible. Considering the casualties sustained even when all went according to plan, the 'Poor Bloody Infantry' were justified in their requests. Yet barrages changed with circumstances. This might mean speeding them up in 1916 in anticipation of a breakthrough, thickening them in 1917 when the Germans reverted to manpower-intensive defenses during Third Ypres, or adjusting them between thick or thin in 1918 according to the specific conditions of the British (and German) lines. Because the whole purpose was to support them, the infantry would always be the over-riding factor behind barrages. But stereotyped barrages were not fired simply because the request was for the same as last time. Gunners would suggest what they thought the best overall support was, and the General Staff and formation commander would then decide. After the war, a gunner and former staff officer reflected that, "Barrages we were never able to dispense with; in fact they were so much in demand that it almost needed interference from the G[eneral] S[taff] to limit that demand." ¹³ Even when the artillery wanted to switch to more productive targets, the decision was made as part of a combined-arms team that had to compromise together.

Defensive artillery work languished from 1915 to 1917, simply because the Germans seldom attacked. Defensive tactics therefore ossified to rigid resistance, firing artillery whenever and wherever the infantry demanded. After this hiatus, it is all the more creditable that defensive doctrine developed rapidly over the winter of 1917-18, although it was still based largely on the practices of ordinary trench warfare. Artillery fire was spread evenly, but everywhere it

was spread too thin to prevent breakthroughs, and the rigid line broke. The response was immediate: the artillery was removed from infantry control. Instead, higher commanders—who (theoretically) had better information and could better judge how to juggle forces—directed artillery and infantry according to the needs of the whole battle. Some offensive tactics were applicable in defense, which only emphasized the continuity of fighting, rather than artificial divisions of attack and defense. Centralization, and hence consultation between the arms, came late to defensive fighting, but once in place combined-arms planning and fighting became the norm here as well.

If gunners had wanted to change the artillery's role within the army, they were handed the opportunity on a platter. World War I offered every reason to change almost everything about an army. Behind the lines, away from the pressures of battle, the artillery could have independently revised its doctrines, or the British Army as a whole could have retrained. Yet artillerymen did not take the chance they were offered.

20

There was no attempt to re-shape training to place more emphasis on the artillery, nor to split it off from the rest of the army. The initial problem was turning enthusiastic volunteers into professional artillerymen, a process that took place in battles and lulls alike. It was actually the winters, free of major campaigns, that allowed training to be improved, since new officers could be spared to learn more of their trade than just daily routine. The powers that were took the opportunity to spread new techniques throughout the artillery, first overcoming the patchwork of units of differing abilities left over from 1915, then building on this foundation. Simultaneously, they raised the technical standard of gunnery and reminded artillerymen of their real purpose: altering the course of battles. Increasingly, artillery officers were taught tactics so that they could take part in, and thus influence, battle planning. As the war was winding down, possibly more a time for satisfaction than criticism, Birch wrote: "One of the great drawbacks in this war has been the want of any tactical knowledge or training ... of officers of the Garrison Artillery...." ¹⁴ This might be read as the revenge of a horse-gunner, but Birch never accepted the second-rate, technically or tactically. No stick in the mud, he worked artillery units into a condition where they could aid the troops in combat, delaying the development of ideas of fighting the war differently until he could persuade the infantry, cavalry, tanks, or whomever to also fight the war differently. By the time an Inspector General of Training was appointed in June 1918, it was too late for a radical restructuring, and anyway the most important publications were produced over the winters of 1916-17 and 1917-18. (Even so, the IGT was overhauling doctrine for a potential 1919 campaign, and artillery was a major element.) The publications gave first technical, then tactical, training. They never wavered from the view that artillery works with, and for, others.

When newer arms like the RFC/RAF and tanks were creating their own staffs and command channels, the gunners did not. There was a brief flirtation with the idea, but once the principles were explained—that it would tend to pull artillery away from their supporting role—the artillerymen consciously drew back. After the war, when the whole army's organization was examined, the artillery's position was revised, but not until then. ¹⁵ There were still substantial and vitally important changes made to the artillery chain of command, changes needed not just because of the failure (especially the lack of flexibility) of the pre-war organization. In 1914

and through 1915 ad hoc formations were created outside the proper organization because the original system could not cope with the realities of a new kind of war. These expedients were unsatisfactory in themselves and unsustainable across a growing BEF. In 1916 changes were made that solved the worst of the problems; from that point on most of the changes were fine-tuning. Much of the improvement in various aspects of artillery work came from having a proper command and staff organization. Some of the minor adjustments gave the impression of empire-building, but the real step to independence was consciously rejected. Birch had wanted to sign his own letters, but this innocuous move would potentially have removed the artillery from the responsibility of the General Staff and undermined formation commanders. Whatever it is now fashionable to think of staff officers, Birch thought they were in a better position to handle matters than separate artillerymen and thus dropped his request. In comparison, the tanks and aircraft each had their own corps, with the RAF later leaving the army entirely. Even the Royal Engineers, the other combat-support arm, had Chief Engineers who in some areas had more autonomy than senior artillery officers. By contrast, the artillery stayed—consciously—in a supporting role, even while the 'support' it provided changed dramatically.

Some authors have suggested that the artillery worked especially with the infantry to form an infantry-artillery style of warfare, to the detriment of other arms and the army as a whole. After the war, Birch wrote: "... the Artillery ... [did] everything possible to support the infantry, which was of course their job." ¹⁶ Yet to take this at face value—that the artillery worked to support the infantry only—and leave out the rest of the BEF would be wrong. The Royal Artillery impartially helped infantry and non-infantry.

Seeing itself as a supporting arm, it was incumbent on the artillery to support any troops in contact with the enemy, whatever form that contact took. The case of the infantry (or dismounted cavalry) was simply the most likely, since these units made up the overwhelming bulk of the army. Yet in 1914 and 1918, mounted cavalry had its RHA batteries operating in close support. In order that this support be the best possible, to 'shake off the mud of the trenches,' during the middle months of 1918 the horse artillery was taken out of action and refreshed its mobile training. It is more difficult to identify specific artillery support provided to the engineers, since the sappers were diffused throughout the army, yet such targets as German gas cylinders or tunnel entrances were shelled. Again, there was relatively little the artillery could do to help the RFC/RAF to repay the assistance rendered by flying units. Essentially the only thing to do was to shell German anti-aircraft guns. The Royal Artillery did so as soon as the necessary technology—a compact wireless set—was available. In the summer of 1915, just as the Germans were improving their anti-aircraft defenses, the Royal Artillery started specifically targeting them, and the very first RFC communiqué related the collaboration of artillery and aeroplanes in deliberately attacking German anti-aircraft guns. ¹⁷ It would not be long before British aircraft would fly over German lines to provoke anti-aircraft fire so that the guns could be shelled, or to force balloons down so they could then be shelled. ¹⁸

Artillery support to tanks was more direct and obvious. Months before the tanks lumbered into action, tank enthusiasts realized that the surprisingly fragile machines needed artillery support. ¹⁹ It was unstintingly given. The first notes for employment of tanks—published before their

debut—continued to stress the importance of British counter-battery fire. ²⁰ In the debut battle of Flers-Courcelette this was provided, as well as elaborate schemes to provide lanes through the creeping barrage so that no tank would be knocked out by British shellfire, another concern of the tactical handbooks. ²¹ As tanks improved, so did German anti-tank defenses, and the Tank Corps constantly asked for more artillery support. They were given not just pre-planned counterbattery fire, but special battery-aeroplane teams to detect and neutralize anti-tank guns. ²² Smoke shell also played an important part in hiding tanks from German fire, and it was used as much as supplies (and weather) permitted, but even it was not a panacea, for tanks could lose direction inside a smoke cloud. ²³

25

Planning could not remove all the friction between the different branches, especially if the planning was faulty. Perhaps the most noted anti-tank action of the First World War was on Flesquières Ridge during the battle of Cambrai, where tanks cresting the ridge were destroyed by unsuppressed German guns on the reverse slope. ²⁴ Yet there had been a smoke barrage on the ridge during earlier phases of the battle to block German observation posts. Planners intended the smokescreen to disperse before the assault on Flesquières Ridge, for reasons lost in another cloud, the mists of time. Had a continued smokescreen been requested by the tanks (or infantry), there is no reason to doubt that the gunners would have provided it. Alternatively, had the German guns been recognized as a serious anti-tank problem, they would have been shelled. They were not, but that fault does not lie solely with the artillery. Later, by 1918, the BEF used tanks freely, but also used more and more assets to support them, including detailing new and powerful aircraft to spot anti-tank guns, bomb and strafe them, and then call in artillery batteries even onto lone anti-tank guns. ²⁵ As the war drew to a close, the Tank Corps were asking the gunners to deal with "all anti-tank devices," which casts doubt on the tank as a war-winning weapon. ²⁶

All this shows that the artillery co-operated with anyone and everyone, not just the infantry. They backed others because it would help win the war, and because it was a faster way of winning the war than to try the approach of 'artillery conquering, infantry occupying.'

Technology and tactics stood in imbalance in 1914, and over the course of the next four years there were dramatic and inter-related changes in both. Aside from the new additions to warfare—for instance, gas and submarines—nothing was more transformed than artillery. Superficially it is easy to canvass the quantities of guns and shells, and deeper examination brings to light the changes within the artillery of improved technology, techniques, and tactics. To some, the quantity and quality of artillery makes the First World War an artillery war, but to the British artillerymen it was not just an artillery war. To them, artillery played a supporting role in a larger production.

Notes:

Note 1: FSR 1909, 138; emphasis in original. [Back](#).

Note 2: See PA Towle's PhD dissertation, *The Influence of the Russo-Japanese War on British Military and Naval Thought* (University of London, 1973) for details. [Back](#).

Note 3: *FAT 1914*, p. 230; original emphasis. [Back](#).

Note 4: It is significant that by late 1916, however often the infantry lost the barrage, they did not blame the artillery for failing in its role. [Back](#).

Note 5: Birch to Furse (Director of Artillery, WO), mid-1917, quoted in Anstey Galley Proofs, 193. [Back](#).

Note 6: Rawlinson Diaries, CCC, 3 and 5 March 1915. [Back](#).

Note 7: The official title was Chief General Staff Officer [Back](#).

Note 8: Rawlinson Diaries, CCC, 1 June 1916. [Back](#).

Note 9: WO158/239, Fourth Army to GHQ 2 June 1917, with Haig's marginal notes. [Back](#).

Note 10: Tudor diary, March-April 1917; see Griffith, *Battle Tactics*, 141, for details of some of the 9th Division's barrages. [Back](#).

Note 11: Anstey galley proofs, 140. [Back](#).

Note 12: Rawlinson diary, 25 May 1917; XV Corps diary (WO95/925), August-September 1917. [Back](#).

Note 13: "F.W.", "Artillery and the General Staff," *Journal of the Royal United Services Institution* 64:455 (August 1919): 475, available as [Appendix 38](#). [Back](#).

Note 14: Birch to Horne, 21 October 1918, Anstey Papers, RAI. [Back](#).

Note 15: "Report of the Committee on Staff Organisation," 6 March 1919, J. H. Boraston Papers, IWM. Senior artillery officers were now to be both commanders (of artillery) and advisers (to formation commanders) with powers of inspection. but were emphatically not staff officers. Rights of correspondence were also clarified. [Back](#).

Note 16: Birch to Edmonds, 12 March 1936, CAB45/122. [Back](#).

Note 17: H. A. Jones, *The War in the Air: Being the Story of The part played in the Great War by the Royal Air Force*, vol. II, (Oxford: Clarendon Press, 1928), 169; No. 2 HARG (WO95/87), BM57, 5 August 1915; C. Cole, ed., *Royal Flying Corps Communiqués 1915-1916* (London: Tom Donovan, 1990), 18. It came on 26 July 1915. [Back](#).

Note 18: *Ibid.*, VI Corps order, 21 August 1915, WO95/87. [Back](#).

Note 19: E. D. Swinton, "Notes on the Employment of 'Tanks'," February 1916 in Fourth Army Operations Papers, vol. 5, letter 6, which foresaw counter-battery fire, bombing aeroplanes, and gas supporting the tanks. [Back](#).

Note 20: "Preliminary Notes on Tactical Employment of Tanks (Provisional)," GHQ, August 1916 in Fourth Army Operations Papers, vol. 5 letter 80. [Back](#).

Note 21: XIV Corps BGRA diary (WO95/915), 12 and 13 September 1916. [Back](#).

Note 22: III Corps BGRA diary (WO95/693), Artillery Instruction No. 8, 17 November 1917; IV Corps BGRA diary (WO95/729), Artillery Instructions 76 and 80 (13 and 18 November 1917); VI Corps BGRA diary (WO95/783), 16 June 1918. [Back](#).

Note 23: V Corps BGRA diary (WO95/756), 1 November 1918, for extra smoke being used on account of tanks. [Back](#).

Note 24: See *OH 1917*, vol. 3. [Back](#).

Note 25: IV Corps BGRA diary (WO95/730), 19 August 1918. [Back](#).

Note 26: WO158/855 "Co-operation of Tanks with other Arms," n.d., but very late 1918. [Back](#).

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